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LIVE STOCK

VOL. XI. NO. 4. SAN FRANCISCO AND LOS ANGELES, CALIFORNIA, JULY, 1903. $1 A YEAR

FOREST FIRES IN CALIFORNIA

Some of the Details Regarding These Fires.

By CHAS. H. SHINN, Head Forest Ranger.

I HAVE lately seen various somewhat misleading statements in print respecting the system under which the fires are fought to a finish in the Sierra forests, therefore I take a few minutes from the actual work of fighting several of these fires to write down some of the details.

The forest reserves are under the charge of the general land office of the department of the interior. A solid little volume of 96 pages called "The Forest Reserve Manuel" contains the principal rules and regulations with which forest officers must be familiar, and those bearing upon fires should be known to all persons going to the mountains. Briefly, the law of 1900 forbids any person to set fire to the forest, or to leave or suffer fire to burn unattended near any timber or inflammable materials. In other words, no campfire is to be left burning; no fire is to be started anywhere and suffered to escape and do damage. The penalty may be a fine of $5,000 or two years' imprisonment, or both.

It is expected that every ranger and other forest officer shall be constantly on the lookout for fires. Fire-warning posters are put up at all available places throughout the reserve. Any destruction of these or other notices is willful trespass and punishable by a fine of $500. It is expected that forest officers should tell campers and all who pass through the reserves about the fire rules and cheerfully and politely instruct them, when necessary, about the proper way of building and managing a fire.

In my experience many persons from the valleys are without comprehension of the nature of the fine, light and combustible surface soil of the coniferous forests of the Sierras. It is really composed [illegible] large part of half-decayed needles of fir and pine and it will hold fire for days. A campfire built over a rotting log is as bad as one started in a mass of dry leaf mould. There is one main rule about all this—scrape off the surface soil and see if you can reach sand, rock or clay to start the campfire upon, or be willing to carry many bucketfulls of water and thoroughly extinguish the fire. Hence the rule, "Do not start any campfire where it may be difficult to put it out." The habit which some persons form of treating the wilderness as just a place to be reckless in leads to many fires. I have known of men who lit a great dead tree or even the branches of a live fir so as to see a vast torch upheld on the rocks. In such cases a fine of $5,000 is within the possibilities. I have known others whose campfires in the soft pine needle soil had to be put out weeks later, after burning over some acres of forest. Men will recklessly build great fires against granite cliffs, so as to hear the rocks crack off and pretty soon the fire will perhaps spread and cause trouble. Then, too, they make fires in the thickets close under pine boughs, or on windy nights without shelter. All these things the forest rangers have to see about. A small, safe fire, well located, and put out when one leaves, is one of the principal signs of an intelligent woodsman.

When fires begin they are easy to check or put out; when they get into the thickets of brush they are very hard to handle. In the first place, the California ravines are deep and wild; secondly, all the undergrowth when well heated will burn fiercely; in the third place, the high trees themselves soon take fire and thus we have broad sheets of fierce flames sweeping up the canyons as fast sometimes as a man or horse can travel. In fact, if rangers are careless or ignorant of their business they can easily be caught in heavy

AN OLIVE ORCHARD NEAR AUBURN, PLA[illegible] COUNTY, CALIFORNIA.

brush and burned to death in such fires. The tools to fight with are axes, spades, shovels, heavy rakes and hoes, with occasionally branches of trees with which to beat out grass fires on the edge. The whole secret of success is to select some sufficiently distant fire line and fight it out there, clearing a path, cutting and burning along it, and then spreading out and struggling to protect it as the fire sweeps up and the flaming brands are blown across.

The smoke from burning *chamaebatia foliosa*, the well known small shrub of the middle Sierras, and from the pines is suffocating and often compels workers to lie flat on the ground, crawl out to get a breath of fresh air and go back to fight it out again.

After a fire has been put out nominally it needs watching for a week or more, or it may break out again somewhere on the edge and do more harm than did the first fire. Then the forest officer goes over and estimates the loss in timber destroyed and the area burned and makes up his account of extra men, if any, that were employed. Especial care is taken to trace up the cause of the fire and if it is due to carelessness or maliciousness every effort is made to find and punish the offender.

The rangers engaged in the reserves are small and they have many other duties besides the control of fires. They are kept extremely busy, but they are well mounted and are young, active and ambitious men, so that they cover much territory. It is the general opinion among the settlers in and near the reserves that forest fires have very much decreased in numbers and extent since the present system was established. In some of the reserves telephone lines have been built; in others which are more inaccessible we must still depend upon signals, close observation and good horseflesh. Night or day, if a fire starts, the rangers converge upon it as rapidly as possible and with a word of friendly greeting take hold on the fighting line.

A Fish Story.

A good story is told of a certain professor from Nevada university who went fishing with several of his students. After an unsuccessful day's fishing they came upon a splendid pool in which could be counted nearly thirty large trout. Every device known to the angler was tried in vain—bait, flies, spoons—all proving unsuccessful. Finally, while the students were discussing a final attempt on the lives of the trout, it was noted that the learned professor was rapidly disrobing behind a big pine tree. On being questioned he confessed that it was his intention to get those trout at any cost. A moment later he plunged into the pool and began thrashing about until the pool was too muddy to see the bottom. Then siezing a scoop net he began pulling it through the water and soon had eight fine trout landed. On returning to camp the cook was delighted and inquired how it was done. "Oh, we got them with the Professor," answered the boys. The next day the cook sat all day on the edge of the pool whipping the water with a Professor fly, one of the old standard trout flies, and wondered why he was not as successful as the other had been.

The most effective object lesson in the use of oil is at Chino, Cal., where the soft, sandy roads have been transferred to hard, resilient semi-asphalt pavements by the persistent use of oil, and teams haul two and a half tons where formerly one ton was a heavy load. Special Agent Abbott predicts the constantly widening use of oil as the result of California's experience.

INTRODUCING SANTA BARBARA COUNTY

A Rare Section of Southern California.

SANTA BARBARA is rightly called the "combination county" of California, because its peculiar location gives it two entirely separate and distinct climatic conditions. Everything that grows in the temperate zone and nearly everything that grows in the tropics as well finds somewhere in Santa Barbara county favorable conditions for growth. It is a sun-bathed area, particularly along the southern shore where Point Conception forms an elbow, and this stern continental outpost is really the dividing line between the soft tropical conditions of Santa Barbara township and the more bracing neighborhoods of Lompoc, Santa Maria and Santa Ynez.

HON. ELLWOOD COOPER'S OLIVE ORCHARD IN SANTA BARBARA.

In such a favored locality there is every opportunity in the world for one who is willing to make any effort. The Santa Maria and Lompoc valleys are great grain-producing valleys; beans also are found in considerable quantity. The mustard crop is of especial interest, as this product is grown for the market nowhere else in the United States. It requires a very rich soil and even then can be grown successfully only every other year. Several thousand acres of sugar beets are grown annually for the United Sugar Company's immense factory, located in the western part of the Santa Maria valley.

Fruits are more extensively grown in the southern part of the county, but the Lompoc community reserve the right to choice winter apples and they are nowhere excelled in quantity or quality. Here the codlin moth does not live and the oldest inhabitant has never seen a "wormy" apple. Very frequently the whole crop is sold on the trees, so great is the demand for Lompoc apples.

The cattle and dairy products of this region are often known to aggregate over $200,000 per year. This northern end of Santa Barbara county has long been known as the center of the asphaltum industry of this country and all our readers are familiar with the remarkable oil discoveries of the past few months on the Lompoc and Los Alamos fields. This advantageous location directly on tide water, with the best railroad facilities, is bound to develop one of the great oil fields of the United States.

If we cross the Santa Ynez range of mountains we soon descend on the sun-bathed, serene, tropical home of the lemon, the olive, the orange and varied fruits and flowers. Pages could be written of Santa Barbara city, its rare climate and healthful advantages, but suffice it to say that the identical charms which hold the eastern capitalist here month after month are also responsible for hundreds of permanent homeseekers who leave the east and middle west and add their small mite to its rapidly increasing population and wealth. Land here along the foothills suitable for grazing or fruit culture, where somewhat broken, can be purchased for $15 to $30 per acre; grain lands from $25 to $100 per acre, depending on location, and the best valley land is from $200 to $300 per acre. The raising of vegetables and small fruits is yearly becoming more profitable and poultry and eggs have a ready sale among the large non-productive city population. This latter source of income is a sure mortgage lifter and has given many a struggling rancher the one start he needed for a home and family.

The mild winters and cool summers of the Santa Barbara valley are most favorable for lemon culture. Lemons are budded on orange, lemon or pomelo roots; one year from budding the trees are transplanted to the orchard and begin to bear in three years. Almost any variety of soil produces good fruit, though one must keep a careful lookout for insect pests. Some of the fruit is marketed by the growers, but the majority is handled through the packing houses of the Lemon Growers' Exchange and the Johnson Fruit Company. Like the climate of Santa Barbara, the lemon is an "all the year round" product, so that the producer is receiving his returns throughout the year. Three hundred carloads of graded lemons were shipped from Santa Barbara alone during the year 1901-2.

Doubtless the most satisfactory product of the Santa Barbara valley is the walnut, for here the tree was first planted on a large scale. Some orchards are started by placing the nuts where the trees are desired, but most growers buy trees two years old, which are planted fifty feet apart. No technical training is necessary in the production of walnuts. All weeds should be kept down and the ground ploughed twice during the winter and early spring. The nuts begin to drop in September; after a thorough shaking of the trees the nuts are picked up and thoroughly dried in long wooden trays; after being graded they are bleached by being dropped into a preparation which makes them more marketable and works no injury. Later they are sacked and ready for shipment. The Walnut Growers' Association fixes the price, and the output is speedily sold to the commission men of the California cities or eastern states. The crop in 1901 amounted to 1,000 tons and brought the growers $180,000. Of this $150,000 was clear profit.

As with the walnut, so also the olive received its pioneer attention in Santa Barbara county. Hon. Ellwood Cooper planted the pioneer orchard and his grove still has an output of 10,000 gallons per year and the oil has an international reputation for purity. An olive orchard can be planted with less labor and less expense than other fruits. The tree is generally propagated by cuttings and will begin to bear four years from planting, increasing in size and quantity of fruit until it is one hundred or more years old.

Lima beans are also an almost exclusive production of Santa Barbara county and the surrounding country. When yielding well this is a very profitable crop. A ton to the acre is considered a fair yield and in 1901 an acre of beans realized from $80 to $90 for the owner. The late Dixie Thompson, a well known figure in early pioneer life, was the most extensive producer of beans in the United States. A view of one of his extensive bean fields is shown above.

The oil interests of the southern part of the county are centered at Summerland, where the famous submarine wells are located. This is the only known instance where old ocean is forced to give up its oil and with remarkable success, for over 1,500,000 barrels have been produced in the last nine years. These wells are for the greater part entirely under water and many of them seventy-five yards from the beach.

The city of Santa Barbara, county seat and business center of the surrounding country, is a city of 10,000 people. with a temporary population of half as many more during the winter. In the past two years, since the completion of the Southern Pacific coast line route, it has made wonderful strides in popularity and many keen observers anticipate more marked changes in the next few years.

The schools are of the best and abreast of every new idea. A $100,000 high school has just been completed and the Blake Manual Training School is a model for similar schools in California.

The church facilities are exceptionally good; all fraternal societies are represented. In the Santa Barbara mission the city has the only active relic of the California mission era now in existence, for here the daily ministrations by gray-headed padres have never ceased since the day the first stone was laid.

The famous Arlington Hotel, the first tourist hotel of California, and the new $1,000,000 Potter Hotel provide accommodations of the highest order. The Potter Hotel is considered the most elegant tourist hotel in the west.

Fine business blocks, excellent street car system, commodious and up-to-date stores, trustworthy banking facilities, exceptional social advantages, and above all the rarest and most equable climate in the United States are a few of the assets which Santa Barbara has to offer and which are being accepted by hundreds of people from all over the country. It has one of the brightest futures of any locality in the state of California, and that is saying a great deal. Keep your eye on Santa Barbara county.

LIMA BEAN FIELD ONE MILE WEST OF SANTA BARBARA, CAL.

To Fight Free Seed Distribution.

The seed merchants are planning an effort to resist the encroachments of the agricultural department upon their private business. The annual "free seed distribution" by the department to farmers and other constituents of members of congress deprives the private seed merchants of at least fifty per cent of what they term their legitimate business.

To add to their distress the department now contemplates the establishment of ten trial grounds, or experimental stations, in various sections to determine which varieties of garden vegetables, ornan rious flowers and forage seeds will best grow and gei een te. This is entering the competitive field with a vengeance and the seed merchants are more indignant than ever.

The American Seed Merchants' Association will soon hold its annual convention in Atlantic City, N. J. Steps are to be taken to bring the merchants' grievances before congress in order, if possible, to have the obnoxious "free seed" clause eliminated from the agricultural appropriation bill.

Delay in the appointment of sheep inspectors has occasioned great inconvenience in some sections of the state.

Orchard and Farm is $1 per year.

PROFIT IN BEES

THAT there is a small risk in the business of raising bees is a statement that a person who knows something of the subject might be inclined to find fault with, says the American Tribune. There is of course no profit earning concern that can be carried on entirely without risk of some kind, but as such concerns go, beekeeping may certainly be classed among those in which the risk is unusually small. I am speaking now of the beekeeping carried out on practical, intelligent lines. There are many who keep bees, but few of these keepers of bees are entitled to the name of beekeeper, used in its fullest sense. The mere keeper of bees often gets good returns; the true beekeeper almost invariably does so.

Bad seasons, of course, are the principal source of loss to the beekeeper, but his crop of honey seldom entirely fails and it is never liable to be destroyed by pests, like some farm crops. Certainly a wet summer occasionally comes, when very little honey is produced, and an exceptionally dry one, when the value of the crop is reduced by the admixture of dark honey, or honeydew, but this of course only alters the returns from year to year; the average yearly return remains the same. After a very little has been earned all the rest is profit, because the working expenses are exceedingly slight—so slight, indeed, that if the work be looked upon as pleasant employment of spare time—as it is, by the by, by a great many—they need hardly be taken into account. Bees are not like the ordinary live stock on the farm. They seldom require what all other live stock constantly demand—food. This is not because bees live without food, but for the very good reason that bees keep themselves.

No serious pests requiring expensive treatment to keep them down prey on bees, neither are they subject to numerous diseases.

A modest start can be made with a trifling expenditure, in some cases with a working capital of $50. The average beginner, however, usually pitches his hopes too high. He must be satisfied if he gets back his original outlay the first year. There is one thing about beekeeping, however, that should never be lost sight of. Unlike other industries, success in this calling on a small scale is no indication of the same on a large one, for in the latter case the working expenses increase and the profits per hive diminish to such an extent that the net returns are very much less in proportion to the expenditure than they are in the smaller undertaking. Carried on in a small way by intelligent methods, in spite of some drawbacks, beekeeping furnishes one of the pleasantest and by no means unprofitable rural pursuits.

The best grades of wool recently brought 20¾ cents at Ukiah, Cal. The offering at this point was smaller than heretofore, due probably to the fact that many sheep men have recently embarked in the cattle business.

Nearly 5,000 acres in Orange county, Cal., are planted to lima beans this year and the yield will be exceptionally large. The crop will average ten or twelve sacks to the acre, making a total of 50,000 to 60,000 sacks. The quality will be good and fair prices are expected.

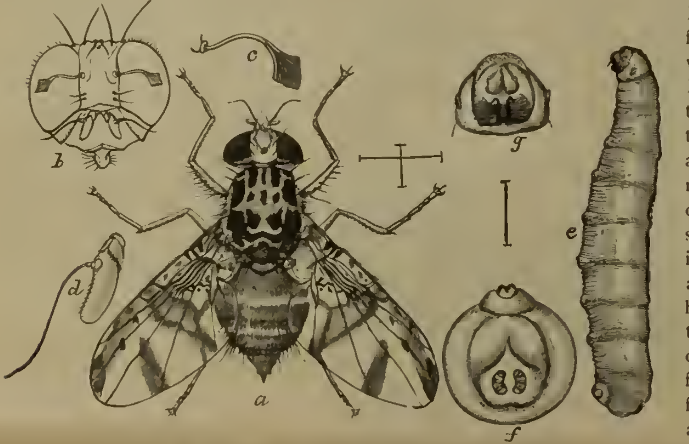
Orchard and Farm is $1 per year. Subscribe now.

FRUIT FLIES AND THEIR WORK

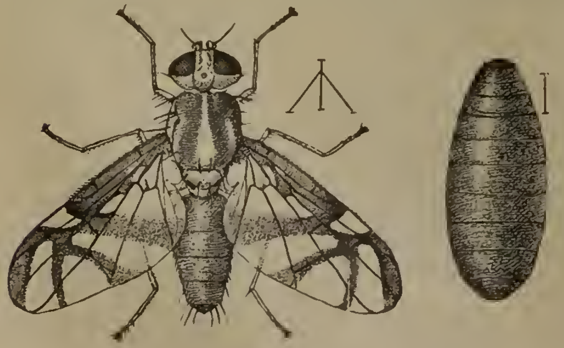
Enormous Damage Wrought By These Troublesome Pests.

THERE has been much in the press in the past few months in regard to "The Fruit Fly" and the impression prevails that there is but one form of this pest which we have to guard against. The fact is that it is a very numerous family and that, in some one of its many protean forms, it exists in many parts of the world and attacks most kinds of fruit.

Fruit flies belong to the order Diptera, or two-winged insects, and are closely related to the common house flies. Most flies lay their eggs in masses and these hatch out into white footless grubs, which we call maggots, probably the most disgusting of any of the insect forms. Some of them choose decaying animal matter upon which to deposit their eggs, some place them in offal and other filth, but the group which we designate as fruit flies, with rare good taste, select our choicest fruits as fitting food for their coming progeny. The fruit flies, like most of their order, lay their eggs in masses, usually just before the fruit begins to ripen. These eggs soon hatch out a mass of small, wriggling, crawling maggots, which commence at once to devour the food so bountifully provided for them, and increasing in size soon reduce the fruit to a disgusting rotten mass around them. Of course, such fruit is wholly unsaleable, even if it could be shipped, which it could not, as the process of decay has been started by the maggots. As soon as they have attained their growth they drop from the fruit to the ground, go through their changes and come out full-fledged flies, prepared to repeat the cycle.



PEACH MAGGOT OF BERMUDA (*Ceratitis capitta.*)



MEXICAN PEACH WORM (*Trypeta acidusa.*)
Puparium at right, adult at left, greatly enlarged (after Howard.)

One of these which has attracted our especial attention, not because it is worse than others, but because it is close to our doors and is, therefore, more of a threatening danger, and moreover because it seems to threaten one of our most important industries, is the Morelos orange maggott. This, like all other fruit flies, is a most disgusting pest, a single orange sometimes containing from ten to twenty maggots. Strong efforts have been taken to keep this pest out of the state by the strictest quarantine measures, but the orange growers of the south still have a constant dread of it. It is distributed all through Mexico and is found in the states bordering directly on our own country. How long we shall be exempt from this dread pest is an open question.

Another of the fruit flies which is found in our neighboring country is the peach worm. A fly which attacks the peaches there in the same manner that the orange fly does the oranges. In Bermuda there is still another of the fruit flies which attacks peaches and which is commonly known as the Bermuda peach maggot. In Europe the olive is also attacked by one of these fruit flies and they cause a loss annually to the growers of five to six million francs. Mr. Hathaway, at one time our consul at Nice, in describing them says: "The fly lays its eggs in the olives, each fly laying about four hundred eggs. The eggs hatch into maggots, which feed on the fruit during the period of development, which continues till the fruit ripens. The maggots cause the fruit to color prematurely, shrivel and drop to the ground. The fruit is rendered unfit for any purpose, except for making an oil which can only be used for lubricating."

Nor are the tree fruits alone subject to their attacks. One of the worst attacks fruits of the melon and cucumber family and is known as Dacus cucurbitæ, and in the Hawaiian Islands a very large percentage of the melon and cucumber crop is destroyed by this pest.

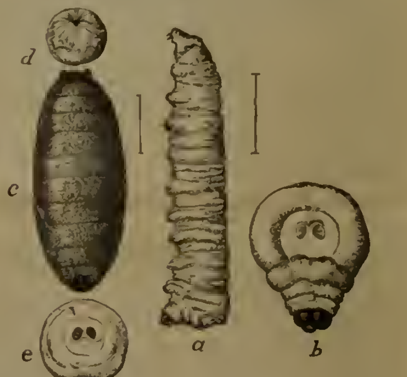
In some of the eastern states the apples are attacked by one of these flies, Trypeta pomonella, which burrows into the ripening fruit and bores tunnels in all directions.

Olive affected by the fly

Two of the worst of these pests, however, are found in Australia, where they are doing incalculable damage to the fruit business. These are known as the Australian fruit fly, Trypeta ludens, and the Mediterranean fruit fly, both likely imported species, and the latter certainly so. In his report to the government the Entomologist of Western Australia speaks of this terrible scourge in the following language:

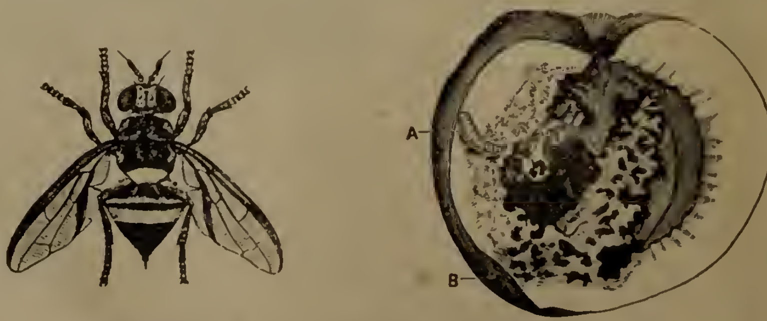
"With the presence of this pernicious pest in th[illegible]te the culti[illegible]on for profi[illegible]f most varieties of fruits will sooner or later have to be abandoned, as owing to the nature of attacking the fruit it is impossible to check its spread by artificial means, as may be done with other forms of pests. The wide range of fruits attacked by it makes even the starving-out process of removing all fruit from trees in districts where the fly is known to occur of little use, as it not only confines its attentions to the domestic fruits, but attacks various species of wild fruits, and has even been reared from the fruit of the prickly pear (Opuntia sp.) in Cape Colony, where it has also become a notorious pest. All efforts on the part of the government there to check its spread have proved useless so far as the records show. In Bermuda, since the year 1866, the peach crop has annually been destroyed and many orchards have been cut down owing to its presence there. The pest is also known to occur in the East Indies and various parts of the Mediterranean regions. It is also found in some of the other Australian states. Just what country this fly is indigenous to is at present unknown, but no time should be lost in tracing out its home and then there will be no trouble in securing its natural enemies."

FEMALE ENLARGED.
(Redrawn from Insect Life by Howard.)



a, larva, b, anal segment of same; c, puparium; d, head of same; a and c, enlarged; b, d, and e, still more enlarged. (Reengraved from Insect Life by Howard.)

Fortunately, no form of this pest has as yet ohtained a foothold in our state and it is to be hoped that with the careful quarantine now maintained we may be able to keep them out.



WESTERN AUSTRALIA FRUIT FLY (*Halyerophora capitata*).

Edward Dixon, a special of the Interior Department, is now in Eastern Oregon warning cattle men and others who have fenced in government lands to tear down the obstructions.

LIVE STOCK INTERESTS

Things the Sheep Breeder Should Know.

DROPPING the wool is a frequent trouble with sheep. There are many different explanations for this annoyance to the flock master, but few of these hint at the fact that wool must be fed or it cannot grow and any failure in its nutrition must result in such a weakness that the fleece fails to keep up its connection with the skin and thus drops off as if it were severed—as it really is—at its root. The fleece of a hundred pound sheep makes up 10 per cent or more of the animal's weight and it consists of a far greater proportion of the most exacting elements of nutrition than the flesh of the sheep does. Flesh has 75 per cent of water in it, wool has only 15 per cent. The flesh has in its dry matter the following elements and wool has the qualities set opposits to them. Thus the composition of flesh is: Carbon, 51.83 per cent; hydrogen, 7.57; nitrogen, 15.01; oxygen, 21.37; ashes, 4.23. Wool: Carbon, 49.65 per cent; hydrogen, 7.93; nitrogen, 17.31; oxygen, 22.21; ashes, 2.0; sulphur, 2.0. Taking into account that the wool has only one-fifth as much water in it as the flesh, it is easily seen that it requires five times as much of the elements of nutrition for each pound weight as the flesh, and thus, if the fleece of the Merino weighs 15 pounds and the carcass, after shearing, weighs 75 pounds, equal quantities of food are required for the production of each. As the fleece must be supplied after the animal itself the wool suffers while the sheep escapes, and as the wool cannot exist without its necessary accompaniment of the yolk and grease, which naturally protect it from injury by the rains, heat and cold, this is to be considered as calling for requisite nutriment, as well as the actual body of the animal.

Every time the sheep is underfed it appears in the wool, the fibre of which shows a thin place in it. The weakness in the fibre is ruinous to the wool, as it causes it to break in the carding or combing. This defect is known by the woolen manufacturers and buyers as "break" and makes it unsaleable. Consequently, the matter of feeding and the regularity of it are special points to be regarded by the shepherd. Yet it must not be supposed that the wool only suffers; the sheep must necessarily suffer, for the damage to the wool is only one of the visible signs of injury to the whole animal.—N. Y. Wool Record.

The Stumbling Horse.

This is one of the most annoying ailments that the horse can be afflicted with. An exchange, in speaking of the stumbling horse, says: The horse that stumbles should not be whipped for the accident. He may stumble because he is badly shod. He may have a nervous disorder that occasionally causes him to lose control over one or another part of the nerves that are used in his complicated work of walking, trotting or running while pulling a load or holding it back. Whatever may be the cause of his stumbling, whipping the stumbler will do no good. The horse does not stumble for pleasure or through design. Stumbling is painful to him. Just why he should be tortured with a whip after his whole nervous and muscular system has been wrenched in a stumble and a struggle to keep his feet no one can tell. The whipping comes after the accident. The horse does not understand that the stinging lash is a warning to him not to stumble again. He regards it merely as an added torture.

The defect is a serious one generally and often can not be remedied without long rest in the pasture. If the horse can be turned out and let run for a year he may get all right again, this when all other remedies fail to help him.

Dogs have destroyed sheep of an average value of $137,019 per annum in one state during the past ten years.

Good Cattle and the Scrub Farmer.

A writer on pure bred cattle and how to keep them first-class puts the matter in a good plain way, as follows:

"A scrub farmer with scrub feeding will soon make scrub stock out of the progeny of our national prize winners, even though they have a long pedigree of royal blood. It takes an improved farmer who will improve his system of feeding and care to handle successfully pure-bred animals on the farm. He must know their characteristics; he must know the relation of various foods to animal nutrition and then be willing to bestow patient care and attention upon the animals he has in charge."

The above sets it strongly, but probably not too strong, for many unfitted by reading and study of the subject have plunged into fine cattle breeding and not understanding proper methods of feeding and management have seen their fine animals go backward in condition and lost the confidence of breeders. They are then ready to denounce fine blood and breeding as a humbug, not being able to see that it was rather their own mistakes. It is hard for one to see his own faults and in this very matter this fact has often been exemplified.

The Original Angoras.

The opinion of Mr. Schreiner, the South African authority, of a pure-bred Angora is as follows: I think it is certain that the original pure-bred white mohair goat was a small, very refined, delicate animal, of great beauty, clipping at twelve months' growth of fleece about from two to four pounds (according to age and sex—kids considerably less) of dazzling white, fine, soft, silky, very lustrous mohair, curling in ringlets from ten to eighteen inches long, with merely the minimum of oil in its fleece requisite to the growth of hair of the highest excellence, so small in amount as to be inappreciable to the unskilled observer. It was perfectly clothed in every part; it had short, silky, curly hair about the face and down the lower parts of the legs to the hoofs; a soft, silky, curly "kuif" (tuft on the forehead) and small, thin, light-colored horns. The ewe was of course smaller and finer than the ram and had only one kid at a birth (of this there is abundant evidence).

Pasturing After Mowing.

Opinion is divided on the wisdom of pasturing hay fields after mowing. Opponents of the practice are very positive in their decision, declaring—and this is commonly conceded—that neither timothy nor clover are pasture grasses and that good hay fields that are to remain so must not be eaten down. The roots of timothy, and of clover in a more particular degree, need to be well stored with plant food for the support of early spring shoots. To accomplish this plentiful storing the plants must be spared their late season leaves. The complete ruin of a clover field by post season pasturing is no uncommon thing. It is true that a good hay crop depends upon various considerations, but a satisfactory one has never been our experience after a full summer's post-haying pasturing.

When we see a team of poor, bony horses with great patches of hair thrashed off with a cruel whip we would not give much for them, but we have more respect for them than for the two-legged brute who drives them.

Sheep have perished by the millions in Australia owing to the continued drought. This loss will be apparent in the price of American wool for several years to come.

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The Live Stock Industry.

It is estimated that the live stock of the United States is worth $4,500,000,000 and that the animals killed on farms and those sold annually for slaughter, together with the horses, mules, etc., sold, have a value of $2,000,000,000. The wool, buttermilk and other products of live stock, added to the annual crops raised, are valued at $6,500,000,000. No other industry can make such a showing in value. These facts fully justify the pending amendment in congress to provide for a more frequent census of agriculture than by decades, for all classes are deeply interested in the greatest industry of the country. It is believed that if the people show a desire for this agricultural census the next congress will amend the census law providing for it.—Indiana Farmer.

Livestock Notes.

Wyoming wool averages a cent a pound better this year than last.

A quarter of a million dollars have been set aside as prizes in live stock contests at St. Louis.

Goat's milk is much nearer to mother's milk in composition than cow's milk. In Germany the children frequently take their food direct from the udder of the family goat, as the kid does. In Italy, which is a goat country, the feeding bottle is scarcely heard of and babies who are not so fortunate as to be nursed by their mothers find in the little Italian nanny their next best friend, and it is not an uncommon sight to see an infant or small child drawing its dinner from the goat, which has been brought to the steps or into the house for the purpose.

A farmer in Champaign county, Ill., says the Drovers' Journal, sold $11,000 worth of horses, the produce of one pure bred draft mare. It is reported that several central Illinois breeders have realized $5,000 to $10,000 for three progeny of a single thoroughbred Percheron mare. There is no pedigreed stock that produces greater returns than pure bred draft mares. They make excellent farm workers and produce high class foals. In view of the increasing demand for registered draft animals for breeding purposes, farmers should retain all their thoroughbred mares and mate them with the best stallions, as there are customers waiting for the produce at remunerative prices.

Australia was the greatest sheep country in the world before the drought struck it. The drought has now continued eight years and shows no sign of a let up yet and the destruction of the sheep has been very large. In 1892 New South Wales was overstocked and about 5,000,000 head were slaughtered and sent out to the country as dressed mutton. But the reduction since 1895, the year that the great drought started, has been growing larger and larger each year. The drought has not been confined to any one section of the country, but has been general all over that continent. In New South Wales, Queensland and all South Australia, and in the eastern portion through Victoria it has been the same and some authorities declare that the loss for the last year will reach the appalling number of 12,000,000 to 15,000,000 sheep, thus making the total loss in Australia in the eight years at least 60,000,000, and the end is not yet. It cannot be otherwise but what this loss will have marked effect on the price of wool in this country and justifies the claim of the fruit growers of the United States that wool will sell higher.—Wool Markets and Sheep.

For two days and nights a fierce fire recently raged on the summit of Bear mountain within half a mile of Bealville on the large ranch of the Kern County Land Company. Over 2,000 acres of land were burned over and only by the greatest efforts were the buildings of the company at the ranch saved from destruction.

ORCHARD AND FARM
LIVE STOCK
Established 1886

WILLARD P. CALKINS, President
THOS. D. CALKINS Vice President

Published the Fifteenth of Each Month at
320 SANSOME STREET - - SAN FRANCISCO, CALIFORNIA
By ORCHARD AND FARM
(Incorporated.)

Telephone Bush - 764

SUBSCRIPTION RATES
ONE YEAR $1 00
SIX MONTHS 50c
THREE MONTHS 25c
SINGLE COPIES 10c

Advertising Rates made known on application.

GUY H. STOKES · EDITOR AND MANAGER.

TO CONTRIBUTERS.
The columns of ORCHARD AND FARM are open to discussions on all topics relating to the interests which the paper represents. Contributions are solicited from our readers.

FUTURE OF THE ORANGE.

THE orange grower, like the prune grower, is facing a condition, and perhaps, not altogether a pleasant one. It has been assumed that there could not be any over-production of oranges and planting has gone on by the wholesale, the crop has increased year by year until now the question arises "What are we going to do with it?" The output this season is something over 23,000 carloads, and it was not a full crop either. It is probable that a full crop of oranges in the state would amount to nearly, if not quite, 30,000 cars. Of the present season's crop a very large portion is still on hand and uncalled for, while the every passing day sees an increase in the fresh fruit in the market and a corresponding decrease in the demand for oranges. The Los Angeles Times takes up this matter and gives its view of it as follows:

The orange crop of the past season has been fairly good—even more than fairly good—but now the growers are "up against it." Usually at this time of the year the fruit is all shipped and sold, but this season it has lagged behind and there are several thousand carloads left to be marketed. What is to be done about it? The situation will not grow better, but rather worse, from year to year, as we produce more oranges. To the average outsider it seems that the proper thing to do would be to advertise southern California oranges in the east and so increase the sale. A short time ago the prune growers of central California encountered a somewhat similar condition of affairs. They went to work and subscribed a lot of money and had advertisements in eastern magazines explaining to people the good properties of California prunes, whereupon they received so many large orders that they had to order out the advertising.

Now, why cannot the orange growers of southern California do something of this kind? It is all right to produce 20,000 carloads, more or less, of oranges and to expect that the world will consume them, but sometimes there is a bit of glut. Why not educate the people on the virtues of southern California oranges? And then, why not put them up in convenient packages? Why not have half boxes of fine oranges packed so that they could be shipped to any point at a reasonable rate?

These suggestions are respectfully referred to the members of the Southern California Fruit Exchange and others who may be interested.

DECIDUOUS FRUIT SHIPMENTS.

LAST season shippers of fresh fruit from California to the east complained of heavy losses in the height of the season caused by lack of accommodation on the part of the transportation companies, delay on the way and the arrival of the fruit at the point of destination in an unmarketable condition. It would appear, in spite of this, that growing and shipping fruit must be profitable, for there was a larger acreage of fruit, especially apricots and peaches, set out this season than in any one previous year, while shipments have rather increased than diminished. In June, last year, up to the 16th, there were 197 carloads of cherries, apricots, peaches and plums shipped from Sacramento. The record to the same date this year is 245 cars and this is being increased at the rate of 30 carloads per day, although it is only as yet the beginning of the season. Shipments of various fruits for the season from Sacramento last year were:

Pears	2011
Peaches	1777
Plums and prunes	1473
Grapes	1033
Miscellaneous	359
Cherries	245
Apricots	222
Quinces	10
Figs	2
Nectarines	2
Persimmons	2
Total	7136

This, from present prospects, will be much surpassed by the present season's shipments.

OUR FARMERS' INSTITUTE.

IT should be the policy of every voter to see that pressure is brought on the administration to see that ample provision is made for the support of the Farmers' Institute. We are glad to see that Governor Pardee has seen fit to encourage this, as well as other efforts at university extension. An index to the general intelligence of our agricultural community may be said to be the attendance in farmers institutes, and it is a pleasure to note the increased interest that is being taken in the meetings.

It is a privilege to be able to hear expert advice on subjects of interest to us, and the time has passed when a good farmer was the man who could plow a straight furrow and know when to cut his grain and nothing else.

Agriculture is becoming more intense each year and in order to keep up with the times it is necessary that the agriculturist be a well-informed man. The time has passed when a man will find out the value of his land through a series of experiments, often disastrous and frequently taking a number of years to demonstrate. An analysis of the soil at the start demonstrates the value of the land for various purposes and it is a waste of time to take years to find this value when it can be discovered in a few weeks. The long tables of statistics, often apparently uninteresting, which are frequently used at the institutes, are an index of what has been done through years of experimenting and the man who does not study them intelligently is the man who simply does on his own farm what the tabulators have done, and even then may not arrive at satisfactory results.

Let us see that our institutes are well attended and let us see that the state supports them as they should be supported.

THERE are less hold-over prunes in the state this year than for five or six seasons.

A NEEDED POSTAL REFORM.

AS an outgrowth of the recent Fruit Growers' convention at Los Angeles there was organized the "California Postal Progress League," with the following officers: President, Edward Berwick, Pacific Grove; vice-presidents—Gov. Geo. C. Pardee, Sacramento; Benjamin Ide Wheeler, president University of California; David Starr Jordan, president Stanford University; Mrs. Phœbe Hearst, Pleasanton and San Francisco; Henry Weinstock, Sacramento and San Francisco; C. W. Emery, worthy master California State Grange, Oakland; Ellwood Cooper, state commissioner of horticulture, Santa Barbara; R. B. Hale, Hale Bros., San Francisco; Hon. Thos. Flint, Jr., president California Senate; treasurer, John S. Dore, Fresno; honorary secretary, M. V. Hartranft, Times building, Los Angeles, Cal.

The aim of the organization is the widest possible extension of the sphere of the U. S. postoffice, so that it at least may afford the American people all those postal facilities that are already enjoyed by old world lands and by the republic of Mexico.

Among these are the following; A domestic parcels post as efficient and cheap as that of Switzerland and Germany. The German postoffice transmits 150,000,000 packages annually; 110 pounds can be mailed for 60 cents. A foreign parcels post at rates as favorable as those prevalent in Mexico. A Mexican can send 11 pounds to Algeria for 40 cents, to Belgium for 35 cents, to Denmark for 35 cents and to Zanzibar for 60 cents. A postal currency for payment of small sums by mail, similar to that in use in Great Britain. Orders for amounts ranging from 25 cents to $5 at a cost of from 1 to 3 cents.

This is one of the postal reforms that must come and should be aided by every producer in the land. We already have it in effect between the United States and other countries, but not between points in our own land. For instance, we are restricted in using our domestic mails to packages weighing four pounds, for which we have to pay 16 cents per pound. So if we desire to send a package from San Francisco to San Jose it must not exceed four pounds in weight and will cost 64 cents. If, however, we or some one on the Atlantic seaboard wishes to send a package to New Zealand he is allowed to send one 3½ feet long, 4 feet around and 11 pounds in weight for $1.32, or one-third less per pound than we can send a four-pound package between the nearest home points.

Of course the wealthy express companies are opposed to any change of this kind, but perhaps the people in time will awaken to their own interests and demand that at home they shall have the same treatment that is accorded to foreigners.

The postal parcels system would be especially helpful to our fruit growers, as it would enable them to send their products in reasonable amounts to the most remote sections of the country and be assured of their delivery in reasonable time and good condition. Under this system fruit could be sent direct from the producer to the consumer and the delay and expense of the intermediary and unnecessary middlemen be dispensed with to a great extent.

The last congress failed to appropriate $10,000 for a test of the domestic parcels post, but that defeat is just enough to make the people hot for this convenience With free mail collection and delivery, parcels post good roads, electric trains and telephones, the country will be the most attractive place to live.

ORCHARD AND FARM is $1 per year.

PROFIT IN CHERRIES.

THE California cherry crop in the counties of the Sacramento valley is over for the season and the crop has been a very good and profitable one. Prices have ranged from 5 to 6 cents per pound and canners and shippers alike have been active in their demands. That there is a good profit in cherry growing is evident from the report of Giblin Bros., who have an orchard near Yuba City, in Sutter county. These gentlemen have kept a careful book account with a small cherry orchard and from this furnish the following statement:

From 302 trees they delivered thirty tons to the cannery at 5 cents per pound, besides selling some at retail for 6 cents. The fruit delivered to the cannery would therefore gross $3,000. The cost of picking and delivering was less than three-fourths of a cent per pound, or $550, leaving $2,450 as net returns from less than three acres. As cherries need little pruning and no thinning, $50 would cover the cost of caring for them, including the cultivation, or a net return of $2,400.

The land on which this orchard is located is slough land and very rich.

CALIFORNIA PROMOTION COMMITTEE'S WORK.

THE following article from the National Magazine, published at Boston, is evidence of the far-reaching effects of the work of the California Promotion Committee and the confidence which its efforts have inspired in the eastern states:

"The work of state development has reached an advanced stage in California, where the leading commercial bodies, boards of trade and chambers of commerce have formed themselves into a central organization known as the California Promotion Committee. The Promotion Committee is devoted exclusively to promoting the settlement and development of the state at large. Its purposes are wholly public and its members are representatives of the local organizations. The success of the committee is remarkable. During the past year—it was organized just one year ago— it has brought 20,000 families to the state and located them through the farming and fruit raising districts. The committee has been instrumental in bringing a great amount of capital and inducing industrial establishments to locate in California. Considering that it is the only organization of its kind in the world and that it has no ulterior purpose to serve, the innovation has been worthy of its support. Rufus P. Jennings, an influential San Franciscan, is executive officer of the committee and was a prime mover in its organization. If the commercial bodies of other states can combine with like success they will do well to follow California's example."

AUSTRALIA'S LESSON TO US.

THE advocates of wholesale importation of cheap Chinese labor may learn a useful lesson from the recent action of Australia, which has passed a stringent measure for the deportation of all Polynesians within its borders during the next three years. The law makes no exceptions. The Polynesians were encouraged to enter Australia under exactly identical circumstances as those being advocated here, namely, a deficiency in the labor supply. The commonwealth's policy is to reserve its industries to white men and women only. Chinese coolies have been expelled from the country long since. The policy of reserving the commonwealth's resources for the benefit of the white race exclusively is carried out to the extreme of prohibiting the transportation of the mails in vessels other than those employing only white labor.

While there can be no doubt that a real stringency exists which would be relieved by the expedient suggested, it takes cognizance only of the immediate present. The determined opposition to the immigration of an alien, non-assimilable race is based on good grounds and is directed toward the future welfare of the country. The nation already has on its hands a mighty race problem, the solution of which no man has yet suggested. The continuance of the Chinese immigration would mean the creation of a still more formidable problem which might come to threaten the very existence of a free laboring white population. It seems incredible that any one can be so blind as to deliberately countenance the introduction into the country of the most serious kind of a race and industrial problem and future trouble for itself for the sole purpose of serving selfish interests. But that is what the admission of the Chinese to America will surely do.

WEEDS.

WE sometimes see the term "noxious weeds," but we would inquire if all weeds are not "noxious" (harmful), considered from the agricultural standpoint. Whether weeds are noxious or not depends on time and place. If the land is not under cultivation far better is it to have weeds than nothing. They prevent the ground from becoming baked and hard. Who has not seen a piece of baked, hard ground remaining for years without a covering? A weed is not noxious if it takes the ground after harvest and protects it from the sun and winds. The quality of noxiousness comes in when weeds are permitted to smother the crop that the farmer is trying to grow. They are especially noxious when they grow in a grain field during a period of wet weather, when the farmer cannot get onto the ground with his cultivator.

Weeds, if permitted to grow in any crop, sap its vitality by using up the plant food in the soil. If they succeed in attaining greater height than the crop they are among they further injure it by their shade. The best way to fight weeds is to keep the ground cultivated and not permit them to get a start. It is surprising how little time it takes to go over land that has been previously cultivated during the season. If done at the right time the cultivation will be effective in keeping down the weeds and the labor will be far less than it would be were the weeds permitted to get a start.

The agitation against the ruthless slaughter of beneficial birds for purposes of personal decoration is at last having its effect and it is to be hoped that the female public conscience is awakening to the evils of the wholesale slaughter of the most beautiful, innocent and beneficial portion of the animal kingdom for the mere gratification of personal vanity. We notice with much satisfaction that the Millinery Merchants' Protective Association of New York has agreed that after January 1, 1904, the "importation, manufacture, purchase or sale of plumage of gulls, terns, grebes, herons, pelicans, humming birds and all song birds shall cease. It is well. Now the ladies may help the good work along by refusing to buy or wear on their heads the plumage of a bird that has been wantonly killed in order to decorate a hat. Most birds are man's best friends—enemies of his enemies. Common sense as well as humanity will finally prevail to stop the slaughter.

Benj. Rush of Suisun, Cal., has been elected to succeed A. B. Spreckels as president of the State Agricultural Society.

FARM MANAGERS.

IT has always been a source of wonder to look over the columns in the papers and to see the numbers who are advertising for places in which to work, and on the other hand to note the number of employers who are looking for men to work, and we wonder why it is that these do not get together. The cry of a scarcity of farm help comes from many sections of the country, and yet there are always advertisements from men looking for places, while with the great prosperity that seems to abide over the country it would seem easy for any man who wants work to get it. One great difficulty, we imagine, with the employers is that business men owning farms for which they wish managers think that they should get men of experience competent to manage affairs for them for far lower pay than they would think of offering to men competent to manage their city business for them, and while the wages of mere laborers have advanced they think that farm managers should still be had for laborers' wages. On the other hand, there are hundreds of men who are looking for managers' positions who are only fitted to work under the direction of someone else. And it is this class of men which so quickly disgust the employers who are seeking competent managers. Now there is a growing class of men thoroughly competent to take charge of farm enterprises, but they are not to be had for a day laborer's wages with a wife thrown in and hundreds are losing money in the employing of incompetent men as managers, because they can get such "farmers" for $20 a month. Men of experience and brains in any calling can command pay in proportion to their ability and farming nowadays is no exception. To get capacity you must pay the price for it.

One of the direct advantages gained by the substitution of oil for coal as a fuel on the railroads is the great decrease in fires in sections along the tracks. Most of the grain field fires of past years have been the direct result of coal-burning in locomotives, whose stacks were either not provided with spark arresters or because the latter had been recklessly removed by the engine crew to secure better draught for the furnace. The San Joaquin valley was formerly sorely afflicted with grain field fires whose origin was traceable to these causes. Since the adoption of fuel oil by the railroad companies operating the lines running through the valley there has been a marked diminution in such fires there. The reason for it is obvious. An oil-burning locomotive throws off no sparks, not even when an imperfect consumption of the fuel in the furnace results in the discharge of a dense column of carbon from the smokestack. The use of fuel oil by the railroads has thus not only cut down the expense of operation immensely, but it has also reduced the liability of the companies for grain field fires to practically nothing and relieved the farmer besides of all anxiety from fire from that source. He has now nothing to guard against excepting the fires which may be ignited by tramps.

Out of the 11,199 rural free delivery routes established during the past five years, it is said that 3,792, or over 33 per cent of them, are located in the states of Ohio, Indiana, Illinois and Iowa. That does not seem to have been a fair and equal distribution of the service among the states.

About $3,500 worth of damage was done by a grain fire on the Nelson and Langenour farms near Woodland, Cal., recently.

LANDS ARE THROWN OPEN.

ON Monday, the 15th ultimo, one million acres of land in southern California were thrown open to public entry. That this was to be done has long been known and very much interest has been shown in the fact, especially by eastern people, who know very little of California conditions. Newspapers and public officials have been flooded with communications and inquiries concerning this land and it looked as though a second Oklahoma rush might be expected. We have heard so much about the value of southern California land, which is worth all the way from $500 to $1,000 per acre for growing oranges, that it is no wonder that the uninformed were ready to jump in and take up a fortune in 160 acres of such land when it was thrown open to them. But while California has some of the best land in the world it has also very much of the worst, and this is the worst. It is situated on the Mohave desert, between Mohave station and the Needles, and if there are two more desolate places on earth it has never been our misfortune to see them, and all the intervening country is a barren, desolate waste, without sufficient water to even provide for the teams that may have to cross it. With water it would unquestionably be first-class agricultural land and that water may possibly be secured from artesian wells at some time is probable, but this is so remote a possibility that no one in his senses would ever take up a claim on the desert on such a chance. It is a region swept by the burning winds, where the thermometer registers 120 to 128 degrees in the summer and where 100 degrees is a cool day; bare of vegetation, except of the scrubbiest description—a barren and forbidding waste. We should not advise any of our readers to leave their happy homes in expectation of bettering their condition by taking up any of this million acres which the government has thrown open. And yet some 6,000 inquiries have been received at the Los Angeles land office concerning it and these have come from every state in the Union and from Canada, England, Australia and most of the countries of Europe. The writer has seen a great deal of that section and for his part any one who likes can have the whole of it for him.

THE COMING PRUNE CROP.

THERE is an uneasy feeling among the California prune growers as to the disposition that will be made of the coming crop. In the Santa Clara valley, which produces the great bulk of the prunes of the state, the crop will not be a heavy one, but in the other prune sections there will be a full average crop. A full crop of prunes now in California would amount to over 200,000,000 pounds and last season's yield was 160,000,000. While not a full crop, the yield this season will be heavier than last and the question of a market is forcing itself upon the growers. For the past two years there was a very heavy shortage in the French prune crop and a great part of our domestic crop was exported to France and Germany and the surplus so disposed of. In 1900–1, 10,021,564 pounds were exported and in 1901–2 this had increased to 23,358,849 pounds. Of last year's crop the shipments were even heavier. Whether the French crop will be large enough to supply home demand or whether there will again be a large purchase of California prunes is the question which largely interests our growers, for with that market closed and a very heavy crop to dispose of the question of handling it becomes a serious matter. The small quantity of hold-over prunes in the state by the time the season opens can have no material bearing on the market. There are not exceeding 400 twenty-ton carloads in the state at the present time of hold-over fruit. This is less than for five or six years. Much of this is expected to be moved before September 1st.

SOMETHING ABOUT COFFEE BEANS.

A CORRESPONDENT asks for some information in relation to "a bean used as a substitute for coffee and which I have heard called the coffee bean."

Our correspondent probably refers to the Soy or Soja bean, which is also commonly called the coffee bean or coffee berry. It is of Japanese origin, growing from two to four feet high. The seeds are white, pea-shaped and make a very good substitute for coffee. Of the Soy coffee 17.07 per cent is soluble when boiled in water for drinking. The one main and essential difference between the seeds of the Soy and coffee is that one contains an alkaloid—caffeine—to which is due its peculiar flavor, which the other lacks. Both contain considerable fat, fibre and albuminoids, but the amount of available nutriment in either case would be inappreciable in a cup of coffee. That there should be so close a relationship in the amount of fat in each is of special interest. It is important to note that the Soy bean roasted is more nutritious than the artificial coffee or barley coffee sold in market and that the two latter contain but little fat and a great deal of carbohydrates (starch and sugar mainly).

A teaspoonful of the ground beans makes a cupful of coffee. It is best to use one-fourth cupful of common coffee and three-fourths cupful of Soy to begin with and one will thus more readily become accustomed to it. If it is too strong it has an unpleasant odor and may be diluted with boiling water. Special care should be taken in roasting. The hull of the bean should be brown, and not black, when properly roasted and the berry should grind easily in the mill.

The seed should be planted about thirty inches apart, in rows, with a bean every six to nine inches in the row. The ground should be prepared as for any other beans. The seeds should not be planted until the ground is well warmed, yet the season may be too short if the planting is delayed much beyond June 1st. After the beans are ripe enough the plants should be moved off or pulled up and dried in the fields in small stacks or piles, after which they may be taken to the barn and thrashed out. Care should be taken not to leave them till too ripe or the pods will shell in handling. A flail is a satisfactory instrument for thrashing them out with, for they must be broken as little as possible in shelling.

This plant, like all other of the legumes, is excellent as a soil renovator and for this purpose may be sown broadcast and harrowed in.

DR. WILEY,, the chemist of the Agricultural Department, who has been given charge of the examination of adulterated articles imported after July 1st, which are placed under the ban by the new law, is of the opinion that the California wine trade will be greatly benefited by shutting out impure and adulterated foreign wines. The new law can be made very strict and the officials of the Treasury and Agricultural Departments sao they will enforce it to the letter.

SUGAR beets have suffered severely this season in Colorado from a pest in the shape of a small white worm about the diameter of a pin and an eighth of an inch long.

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PLANT LICE ON MELONS.

COMPLAINT is made by the melon growers in many parts of the San Joaquin and Sacramento valleys of the destructive work of the aphis, or green fly, on their vines this season and from the statements made it would appear that the pest is worse than usual in some parts this season. The life history of this insect is the same as that of the greater part of the aphis family. The first brood hatch from eggs laid the previous fall on weeds, twigs or other places where they will find protection. As soon as the warm weather of spring comes these eggs hatch on the plants where the eggs have been laid and all are females. Some are winged and some wingless. The winged form fly to the young melons, take up their lodgment there and begin to give birth to others, all females, at the rate of several each day, and as a result there is an alarming increase and they seem to appear all at once. The indications of the presence of the pest are a curling of the leaves, especially those near the center of the hill—caused by the pests feeding on the under side—and the presence of honey dew, the exudation of the insects, on the ground under the vines. This honey dew is very attractive to ants, and generally speaking the presence of numerous ants running to and fro on the vines can be taken as an indication of the occurrence of the melon aphis somewhere in the immediate vicinity. Since these aphids feed upon a large variety of plants, including many of our common weeds, clean cultivation is of prime importance. Clean cultivation will do much to lessen their chances of rapid development in the early spring and it may do away with them entirely for the year. Also, at the close of the season, all weeds, vines and other trash in the fields, together with the weeds growing on waste lands in the vicinity of melon patches, should be raked in piles and burned. If the land is covered with a growth of young plants in the fall it should be plowed deep before winter, so as to destroy all weeds and other plants that are likely to harbor plant lice or their eggs. As a method of destroying the aphids after they appear on the vines J. J. Thorner, of the Arizona experiment station, recommends fumigating the vines with carbon bisulphide.

The method of fumigation consists in covering the young vines with tight boxes or covers twelve to eighteen inches in diameter and introducing under each box a vessel containing one or two teaspoonfuls of carbon bisulphide. One teaspoonful should be allowed for every cubic foot of space under the cover and this will easily kill all the plant lice in three-quarters of an hour, though it will do no harm to leave the cover in place for an hour. A cheap tin cup, a clam shell, a saucer or other open dish will answer to hold the carbon bisulphide. It is very desirable that the cover should fit snugly to the ground, either being pressed into the soil a little or having the loose earth pressed against the lower edge; otherwise the heavy vapors will escape from below and not fill the space above. Boxes may be made from wood or paper, or as suggested by the New Jersey experiment station, two barrel hoops may be used, one hoop being cut in two and the two halves being crossed so as to make a dome-shaped framework, over which heavy paper or cheap muslin (the latter dipped in linseed oil) may be tacked and pasted and the cover thus made practically tight. With fifty or a hundred of these covers a field can be treated quite rapidly.

It may be desirable to say a few words about carbon bisulphide. It is a colorless, volatile liquid with a disagreeable odor. Its vapor is heavy and about as inflammable as that of gasoline, a spark from a cigar or pipe being sufficient to ignite it. It is, however, no more dangerous in this respect than gasoline. The vapor is also very poisonous to all animal life, but no one need fear inhaling small quantities of it in the open air.

THE RESOURCES OF HUMBOLDT COUNTY, CAL.

A Section Famous as a Grain Producer.

HUMBOLDT COUNTY not only possesses the most valuable timber resources of any county in the state, its forests covering thousands of acres of valuable redwood, pine, Douglas spruce and fir, but the fertility and resistance of its land is surprising.

Eel River valley and Arcata Bottom are unsurpassed in productiveness by any other land or like area in the state. In the '70s potatoes were the principal crop and scows and lighters were constantly plying between Hookton, Arcata and Eureka, loaded to the water's edge with the tuber. During the years 1875-6, 108,036 sacks of potatoes were shipped to San Francisco, each sack containing 120 pounds, amounting to 12,960,020 pounds. As many as 324 sacks were raised on one acre. Twenty-one and one-half tons to the acre were raised on the J. B. Hill farm near Ferndale. The blight having affected the potato crop very much lately, and other crops being more remunerative, the production of potatoes has declined materially in the last few years.

Humboldt county is particularly adapted, both in soil and climate, to the raising of oats. The bottom lands will produce 100 bushels to the acre, and as many as 140 bushels have been taken from an acre. While the hill land will not produce as many bushels per acre yet the oats are of an exceeding fine quality. The amount produced per acre will exceed that of any of the states east of the Rocky mountains. The raising of oats on the thousands of acres now used for the grazing of cattle and sheep is only a matter of time. Oat raising in Humboldt is always a safe proposition. The price is steady, no fluctuations, and the crop is always safe, with rich returns.

EUREKA FOUNDRY CO., N. H. PINE, PRES., HUMBOLDT COUNTY.

Eel River Valley and the Prosperous Town of Ferndale.

In the southwest corner of Eel River valley, a section of country 13 miles long and 7 miles wide, teeming with wealth and capable of supporting many times the number of people now making it their home, lies Ferndale, a veritable garden spot dotted with shade trees and pretty homes surrounded by gardens of many flowers.

The town is incorporated and is well laid out on a slightly undulating plain and the soil is of unexcelled fertility. It contains a population of about 1,200, while several hundred additional are settled in the immediate neighborhood. It has a good and efficient water supply and an electric light plant modern in every respect. The electric power company is preparing to enlarge their plant by extending it from Bear river, fifteen miles distant, so that it will be possible when this work is completed to furnish all the creameries in this district with a sufficient supply of electric power.

The public schools are up-to-date in the course of studies adopted and in the staff of teachers. The latter are all earnest, capable and experienced and are eager to keep the standard of the work up to the highest point.

The city has one bank, doing quite an extensive business under careful management, with A. Putman as president and J. H. Trost as cashier. There is a complete telephone system, affording ready means of communication with the surrounding country.

Every branch of mercantile business is represented by stores, carrying large and varied stocks.

Ferndale is exceedingly fortunate in its location in one respect—that is, that it is in a country where a failure of crop is unknown. The heavy rainfall and the ocean fogs keep grass growing the year round, making it an ideal dairy country.

All over Eel river valley the country is divided into farms of moderate acreage, devoted principally to dairying and owned by progressive and well-to-do farmers, who are fully alive to all the capabilities of the lands. On every side are seen the cosy homes of farmers, prosperous and contented.

To show the extent of the dairying industry in this neighborhood it may be stated that seventeen creameries are in active operation in this section and in Ferndale alone these concerns pay out to the farmers for milk delivered an average sum aggregating $50,000 per month the year round.

Values on land in this section range from $200 to $500 per acre. Real estate dealers are practically without a field in Ferndale, as no realty is offered for sale. When a piece of land is offered for sale it is quickly taken in by some local buyer at the price for which it is offered.

SOME EUREKA NOTES.

G. R. Georgeson of Eureka conducts one of the largest real estate concerns in Humboldt county and no man within its borders is better posted upon property values of all descriptions or is better equipped to transact business for others in a satisfactory and intelligent manner. Mr. Georgeson is a large property owner himself and is at present engaged in constructing what will rank as the finest modern business block in Eureka. Mr. Georgeson has been one of the leading spirits in inducing capital to enter the Humboldt county field of industrial affairs and the enterprise and energy inducted into his personal business movements has likewise been unselfishly applied in doing everything in his power toward upbuilding and advancing the growth and prosperity of Humboldt county.

Pioneer Firm.

For many years past Buhne's Big Store firm of Eureka has occupied a front rank in local commercial circles and has enjoyed an extensive patronage from the entire surrounding country, both on the land and from the ships sailing into Humboldt bay. The firm has through its long business history ever borne an enviable reputation for the straightforward manner in which they conduct business and it is, therefore, not surprising that they hold and retain the confidence of the public. H. H. Buhne, the present head of the institution is well and favorably known in this part of the state and so far as Humboldt county is concerned he takes a deep interest in its welfare and is ever ready to devote time and attention in behalf of his old home. The hardware and grocery trade is covered in its entirety by this concern and they can always be depended upon to do the right thing by their patrons.

Electric Railway System.

One of the most notable improvements inaugurated in Eureka is the introduction of an electric street railway system. The franchise has been granted by the city government to Mr. George Henderson and associates and active operations are now under way for its construction. Mr. Henderson is devoting his personal attention to this enterprise, which is a sufficient guarantee that it will be carried forward with business-like dispatch. Mr. Henderson is a gentleman who has successfully conducted various important enterprises on this coast and the people of Eureka and Humboldt county are to be congratulated upon the fact that he is at the helm in the management of this local improvement. The construction of the city line will be pushed forward to completion as rapidly as possible and then doubtless the company will extend its operations to other points in the county. The company starts out under most favorable conditions and its future success is assured, as the field is one of the most promising in the state.

Eureka Foundry.

One of the principal industrial institutions in Humboldt county is the Eureka Foundry Co. at Eureka. The company's plant is modern and complete and with the regular working force of fifty men a large amount of machinery of various kinds is turned out. Shingle-making machinery is a specialty of this foundry and orders are received from all over the country for this class of work.

Trade Notes.

It is a matter of particular moment to our lady readers that they should be in a position to do their own dressmaking and millinery. Such an accomplishment not only means thorough satisfaction to those who possess it, but it means an immense saving of dollars and cents. In fact, it is a most practicable and sensible thing to know. And it is as easy as it is practicable. The McDowell Dressmaking and Millinery School, whose card appears elsewhere in this issue, has built up an enviable reputation on this coast for thoroughness in all its departments and the prices of tuition are within your reach. In sending for circular kindly mention this paper.

One of the features of the seventh annual convention of the Pacific Coast Electric Transmission Association, held on June 16th at San Rafael, was the paper read by H. A. Bullard, local manager for the Wagner-Bullock Electric Co. The paper was exhaustive in detail and evidenced the master mind in its preparation. The subject of single phase motors as an effective means of increasing earnings of multi-phase plants was presented in a clear, concise and effective manner and showed that Mr. Bullard was thoroughly at home with his subject. The paper has been printed in pamphlet form and if you are interested in the motors send for one to the Wagner-Bullock Electric Co., 629-31 Mission street, San Francisco. Don't forget to mention this paper.

In the past few months, according to the secretary of the Petaluma, Cal., board of trade, about 500 families have settled in the region tributary to that place, investing at least $750,000 in cash. Fifty or more new families have settled in the Placer county fruit region, fifty more around Gridley and Biggs, in Butte county, 500 in the Lodi district and similar bunches are reported from many districts. Over $1,000,000 has recently been invested in real estate around Stockton. Such a great number of intelligent and progressive people going into fruit, vegetable and stock raising and dairying will have a strong influence on the progress of these industries. The California Promotion Committee has the cordial co-operation of local boards of trade and has expended nearly $40,000 in its work so far.

HORTICULTURE : VITICULTURE

Is There an Effective Parasite for the Codlin Moth?

Edited for ORCHARD AND FARM by JOHN ISAAC.

It is a rule, so generally established that it may be called a fact and far removed from the realms of theory, that every injurious insect, and many that are not injurious, has its parasite that keeps it in check and that where this parasite exists in sufficient quantities there is little danger of the injurious insect becoming a serious pest. It is upon this rule that we have acted in California and with pretty good results, but as yet, we believe, no effort has been made to discover or secure any natural enemy of the worst of our orchard pests, the codlin moth.

We know pretty well that the moth was brought to us from Europe, where it has been known since apples were cultivated. In fact, we get its common name, codlin moth, from the codlin apple in England, yet we believe in no part of Europe is it the serious pest that it is in our country. There are always some wormy apples, it is true, but these form a very small percentage of the crop and no spraying is done for it either. Now what is the reason that the moth is not as severe a pest there as it is with us? Climate will not account for it, for it thrives in all kinds of climate here, from the frigid in Minnesota and Wisconsin to the torrid in the southern part of our own state. The natural inference is, then, that there is some check at work on it in its native country and that if we search we shall be able to find it and perhaps save the many thousands of dollars now spent in fighting it, besides saving the large portion of the apple crop now annually lost by its depredations. In the natural order of things there should be such a parasite and we notice that in the Cape of Good Hope, according to the Agricultural Journal, the official agricultural publication of Cape Colony, that a good if not wholly efficient parasite is at work on the pest there, and that a large hymenopterous parasite has been reared from larvæ collected from rough bark. The Journal reports in some cases one-third of the worms as parasitised and advises scraping the trees to secure the parasitised larvæ, the scrapings to be placed in boxes and covered with a fine wire screen, so that the moth cannot escape, while the parasites can be saved and liberated to continue their good work. Of course the destruction of the scrapings would also destroy the beneficial insect with the injurious one. The search for a discovery and introduction of a parasite for the codlin moth opens a wide new field for our entomologists and success therein would mean many millions annually saved to our apple growers.

A YUBA COUNTY, CALIFORNIA, SCENE.

The Montana State Horticultural society has adopted as the standard package for apples a box 12 by 19 by 22½ inches.

PACKING FLOWERS

California is pre-eminently a land of flowers and especially during the winter months. When our gardens are in full blossom and the east is covered with snow very many of our lady readers are desirous of sharing with their eastern friends some of the beauties which nature bestows on them with a bounteous hand while depriving the less fortunate in the colder sections of them. The following hints, which are given by an English paper for packing flowers for the London market, will apply equally well here and for the benefit of our lady readers we reproduce them:

These directions are professional and are especially intended for women beginning florists' work and the sending of wild as well as garden flowers and greenery to customers by express or messenger. To pack flowers successfully requires a certain knack and deftness which only practice can give, but still a few hints may be of some help. The first necessity is that they shall be put in so tightly and closely that it is not possible for them to shake about. To do this without crushing or bruising them is by no means easy. Further, the air must be excluded as much as possible and the packer must aim at keeping the stalks damp and the blossoms perfectly dry.

All the flowers in one vase should be lifted out together and laid on the table before the packer on a soft cloth; if they are pulled from the vase one by one as they are required the remaining ones will probably fall out and be bruised. Ferns, foliage, rushes and grasses are first laid flat in the bottom of the basket; next comes the coarser and more robust flowers, such as wallflowers, sweet williams, daisies, etc., arranged with the blossoms towards the outside of the basket and the stalks towards the middle. In the cavity which will then be left pack the more fragile or valuable flowers—roses, for instance—firmly wedged in round the stalks with moss.

Every individual flower or bunch must be arranged separately in its place and the longest or largest must be put in first. When any blossom seems likely to rub against the side of the basket protect it with a pad of cotton wool, which must always be dry. The little sheet of cotton wool is then placed on the top of the flowers and tucked in neatly round the edge of the basket. By roughly making a box-plait lengthwise in the brown paper top it can easily be passed under the handle and fixed in its place. While it is being tied down with string, which must be done both round the top of the basket and across it, it is best to get some one to hold the paper in its place.

The basket should be so well filled that the covering on the top presses pretty firmly upon the flowers, otherwise they will shake about and be bruised. It is scarcely possible to pack them too tightly, for after they have been some time in the basket they will shrink and get looser. Flowers packed in this way will arrive, after a journey of fifteen or eighteen hours, as fresh and as stiff as if they had just been gathered. They travel with least damage at night.

Of all flowers roses are the most difficult to pack and though they last a very short time in the poisonous atmosphere of London they are what everybody will ask for; they are also more easily damaged by wet or hot sun than anything else. It is best to pick them—as, indeed, is the case with most flowers—before they are full blown. Baskets of roses only must be lined round the top, where the heads of the flowers will rest, with cotton wool.

Most bulbous flowers pack and last well—daffodils, narcissi, tulips, lilies of the valley; the latter are always in immense request. Tall lilies are difficult to manage on account of their size; they require special long baskets, as these flowers are not worth having without long stems. The flowers, too, are liable to break off and must be carefully padded. All sprays of flowering shrubs must have the wooded stem peeled as far up as the water mark and before packing each one must have this end wrapped round with a little moss.

Losses from Insects.

It is only within the past century that entomology has advanced into the ranks of sciences and has become respectable. Prior to that a few men, the pioneers of a noble science, possessed of a keen power of observation and urged on by their curiosity, made a study of insects, their lives and their habits, but were looked at askance by their fellows as men of mean intellects, engaged in a contemptible pursuit beneath the dignity of intelligent men. Few then realized how important a part these insignificant members of creation played in the prosperity, happiness and welfare of mankind. With our advanced knowledge we have learned that the mighty forces of the minute world, when arrayed against us, are more formidable than all the powers of man and that a flight of locusts is more to be dreaded than the march of an army. Yet a large majority of people even now are not aware of the destructive force of the insect world or the enormous damage which mankind suffers annually from their depredations. In Harper's Weekly, Dr. H. C. McCook gives some startling statistics on this subject. According to this authority the chinch bug caused a loss of $30,000,000 in 1871, upwards of $10,000,000 in 1874 and in 1877 $60,000,000. The Rocky mountain locust, or grasshopper, in 1874 destroyed $100,000,000 of the crops of Kansas, Missouri, Nebraska and Iowa alone. For many years the cotton caterpillar caused an annual average loss in the southern states of $15,000,000, while in 1868 and 1873 the loss reached $30,000,000. The fly weevil, our most destructive enemy to stored grains, particularly throughout the south, inflicts an annual loss in the whole country of $40,000,000. The codlin moth, the chief ranger of the apple and pear orchards, destroys every year fruit valued at $30,000,000 to $40,000,000. The damage to live stock inflicted by the ox bot, or ox warble, amounts to $36,000,000. "These are fair samples," says Dr. McCook, "of the enormous money losses produced in one country by a few of the pigmy captains of pernicious industry, whose hosts operate in the granaries, fields, stock farms and stock yards of our country What is the grand total? In 1899 E. Dwight Sanderson, after careful consideration of the whole field, put the annual loss in the United States from insects at $400,000,000.

LATEST IN POULTRY RAISING

Muscovy Ducks.

NATIVE home, South Africa, and also are found largely in Guinia, Brazil and adjoining countries. In their native state they are a wild variety and, while a duck, are decidedly different from any other domesticated or wild variety known to man. A peculiar feature of the Muscovy, says Item, is that they never quack like all other ducks. The drakes are at some seasons of the year very pugnacious, especially at laying time, and will battle viciously among themselves. Other domestic varieties stand no show whatever with a Muscovy in a test of strength and enduring qualities.

The standard of perfection recognizes two varieties of the Muscovy family—the colored and white. There is practically no difference except in color. The drakes are large—nearly double the size of the ducks—and often weigh nine to eleven pounds each; are large in frame, long in body and across back; are shorter in shank, with broad web feet with long, hawk-like claws, and are the most powerful of any variety of the duck family. Wings are of good length, very compact, and are the chief means of battle and defense, striking sledgehammer blows at a surprising rapidity. During the autumn and spring we find it necessary to wing both males and females, as they delight to fly all over the farm and also adjoining farms simply for exercise. This is easily accomplished by cutting off the ends of seven flights of one primary. They are not a migratory bird and fly simply as a means of transit about their home surroundings. They are largely bred at the present time nearly all over the civilized world. In the United States they are mostly found in the southern states and along the Atlantic coast. One drake will mate with ten or a dozen ducks; however, if the flock contains enough males they will mate in pairs. Being less of puddler and swimmer than other ducks, they do not require as much food as other domestic varieties. Some writers have quoted them as poor or ordinary layers. This we have found incorrect.

Having bred them for many years and in large numbers, we believe them to produce more eggs than any other standard variety. They usually commence to lay in April and if not allowed to sit will continue until November.

Unlike all other varieties of ducks, unless it be the little ornamental Calls, Carolina and Mandarins, the Muscovies invariably prepare their nests and deposit their eggs, while other domestic varieties must be penned at night, otherwise they scatter them broadcast. The duck prefers a hollow log or stump for her nest and will usually lay fifteen or nineteen eggs for a laying and all will invariably prove fertile.

The young are active and strong from the shell and barring accidents will grow to maturity. Another peculiar feature of the Muscovy is that it requires five weeks to hatch their eggs instead of four with all other varieties of the duck and goose family. If not allowed to sit and hatch the Muscovy will continue to lay until late autumn. Unlike other varieties, they moult but once a year, and being a native of or near the equator they cannot stand the weather as well as some other varieties. It is no uncommon sight to see one or more Muscovies sitting on the fence or some building just as contented as if on the ground. The original color of the Muscovy was mixed black and white, the latter predominating. By careful selection for many generations the white have been produced; however, the young the first year will nearly all have a black patch of feathers on top of head and occasionally a few colored feathers on hollow of back, which disappear usually after the first month.—Farmers' Voice.

W. G. Welch of Petaluma recommends that hens be kept four years and condemns the practice of selling at two years old. He maintains that a hen of two years is in her prime if she has been properly fed and cared for.

Cleanliness With Poultry.

The beginner seldom realizes the importance of keeping the chicken coops and houses absolutely free from lice. The poultry column may insist ever so strongly and repeat again and again the warning, but only experience seems to be able to impress the lesson. One poultryman who has been unusually successful recently told the writer that he is about to sell off every fowl on his place and begin anew with good eggs and an incubator, so as to get entirely rid of vermin. Even then care must be taken not to introduce new fowls from other ranches. Further, everything must be kept clean. The foul, filthy coop is the breeding place of lice and mites and it is there that these chick torments thrive and swarm, and as chicks and lice cannot live happily together the ranch should be vacated by one or the other. There is no profit in raising lice and little in raising the combination of chicks and lice, so the wise poultryman will wage a war of extermination on the lice. When once eradicated they can be kept out by cleanliness and care, as they do not grow spontaneously.

To get rid of lice the coop or brooder should be well scraped and swept out and then thoroughly scalded with hot, soapy water. Remember that lice even if removed from the coop bloom and flourish in the new location, so give the sweepings a thorough drenching with hot suds and then remove them to a safe distance from the chicken yard. When the coop dries paint it well with kerosene.

Next turn your attention to the chickens if you do not feel like beginning anew with eggs and incubator as my friend did. With perfectly clean coops and houses a weekly dusting with some good insect powder is effective. If this is continued for a month or two it will rid your poultry of lice. It is a troublesome process to accomplish all this, but if you are in the poultry business in earnest it pays.

How to Test Eggs.

A new method of testing eggs for their freshness has been communicated to the agricultural society of Saxony. An egg plunged in water tends to rise with more buoyance according to its age, owing to enlargement of the empty space at the thick end by evaporation of water from the white; hence the egg takes a different position in the water. Fresh eggs remain horizontal, an egg three to five days old makes an angle of 20 degrees with the horizon, one eight days gives an angle over 45 degrees and at the end of fourteen days the angle is 60 degrees. An egg three weeks old lies at 70 degrees. One three months remains vertical and when it is older still it floats.

Poultry at St. Louis.

Great effort is being put forth for the greatest poultry exhibition in connection with the world's fair at St. Louis in 1904 that has ever been held in this country. It is pretty well settled from present indications and plans already developed that there will be over thirty acres devoted to the live stock shows and the poultry will have all accommodations needed.

The dates have already been settled upon for the poultry show, which is October 24th to November 5th. The extent of classifications will permit of innovations not practical at ordinary exhibitions.

Probably the cause for chicks dying in the shell can be traced directly to the breeding stock in seventy-five out of one hundred cases. Unhealthy breeding stock cannot produce healthy offspring. If the chicks pass through the incubating season the chances are they will die before they reach the age of three weeks. There are also other reasons for chicks dying in the shell; prominent among these in artificial methods is a lack of or too much moisture, poor ventilation, etc.

Story of an Egg.

If a fertile egg has been incubating for even twenty-four hours a small speck is visible, but it is not discernable in thick or dark-shelled eggs; but if the egg were broken open it would be perceived that the vesicle had enlarged and radiating from it would be a number of minute blood vessels.

On the third day these blood vessels will have completely surrounded the yolk and the small dark spot in the center will be developed into the eye or brain. The brain is the first part to take definite form.

On or about the fourth day a respiratory membrane is formed and the egg gradually increases in opacity until after the seventh day it is not practicable to form any judgment of the progress of the chick by means of light.

By the tenth day the bones of the skeleton have begun to assume consistency, the internal organs have a decided shape and the heart is formed and all vital parts are complete. On certain parts feathers are growing and all development from hence is rapidly carried on.

On the twelfth day heat is given out and this is easily demonstrated to those who use incubators, as less heat is required to keep up the temperature and it is generally necessary to move back the weight.

The chick reaches its perfect form on the fifteenth day and from thence grows in size until on the nineteenth day respiration through the lungs takes place.

Up to within a few hours of the exit of the chick from the shell the egg bag lies outside the bird. Immediately before hatching it is absorbed into the intestines and forms sufficient sustenance for the chick for twenty-four hours. Therefore people should avoid attempting to cram the little birds until this time has passed, when, if they are healthy, they will help themselves readily enough.

If all has gone well the eggs will begin to chip not later than the twentieth day and the chick leaves the shell unassisted in from twelve to eighteen hours after the first appearance of the bill.—Massachusetts Ploughman.

Poultry Notes.

Eggs half a day old are better for the kitchen than fresh laid eggs.

In hot weather be sure to provide the chicks with plenty of shade and fresh, cool water.

Intelligent feeding and proper housing are the two great elements in successful poultry raising.

F. R. Bushnell of New York says: The second importation of brown Leghorns to this country in 1852 by Captain Gates of Mystic river, Ct., contained both single and rose comb brown Leghorns. For this reason we are thoroughly justified in saying that they are a pure Leghorn and not a made-up variety. Their breeding for many years has also proved it. Their merits justly entitle them to be called the standard fowl of to-day, in the sense that Webster defines the word standard as that which is established as a model. There are a few qualifications a bird must have to be in the lead. First is egg production, which has been earned by and given to the Leghorn. Next is hardiness. This quality is so prominent that many advertisers use the picture of a young rose comb brown Leghorn as the most perfect type of hardiness. The clean, yellow leg is very important in this country, as well as having a fowl that will give the best results from a given amount of feed. Careful experiments show that this variety is justly entitled to a place far in the lead in this point. Nearly all of the rose comb brown Leghorn breeders of today are those who have previously tried other varieties, but finding the Leghorns superior in so many respects are breeding them exclusively, or nearly so.

NEWS OF THE RURAL WEST

Progress of Various Districts Along the Coast.

San Diego County.

Crops in this county have never been better than they are this season. Haying is over and the yield has been two to three tons to the acre. Heading is now under full headway and the grain crop is a bouncer. Wheat has made a rank growth; the heads are all large and well filled.

Corn is of fine quality and doing well, while vegetables and fruit are showing up better even than last year. Fruit trees of all kinds are loaded, especially apricots, which are bearing enormously.

There has been an unusually heavy rainfall here this season and it is telling on crops. Rain has come at good intervals and has continued late.

San Diego is the banner honey county of the state and the flow this season is the heaviest in the past ten years. The crop of the county will total about 2,280,000 pounds, or 76 carloads.

San Bernardino County.

The Chino Valley Creamery Association is now receiving about 9,000 pounds of milk daily and manufacturing an average of 400 pounds of butter.

The Kingsbury marmalade factory at Redlands is increasing its plant and establishing a branch at Pasadena. It is intended to greatly increase its output of by-products of the orange and lemon.

Cut worms have been doing much damage in some parts of the Chino valley. Whole fields of alfalfa have been almost stripped and vegetable gardens have suffered severely.

The heaviest hay crop in years has been cut and grain harvesting is well advanced. The barley crop, which is the chief grain crop here, is simply immense.

Orange shipping is practically over for the season; some few carloads still remain to go out, but the great bulk has been disposed of. The crop was much heavier than was expected at one time.

Santa Barbara County.

Grass on the hills is drying up fast and pasturage is getting short. Lessened returns from the creamery indicate the effect this is having on the milk supply.

The apple crop of Lompoc will be a light one this season. The crop is now so far advanced as to tell to a certainty what it will be. Of Bellefleurs and Pearmaines, the two standard varieties in this section, there will be little if any more than half a crop, while few varieties are up to even a good average yield.

Bee Inspector Hinckley reports bees as not doing as well in the southern as in the northern portions of the county, which he accounts for by the prevalence of fogs during the past two months.

The army worm has appeared in some districts and is doing much damage.

Harvest hands and farm laborers generally are needed here at the present time, as they appear to be all over the state.

The mustard crop in this county has been severely attacked by cut worms. It is not a full average this season, but will turn out light—some growers estimate sixty per cent.

Harvesting is going on, but owing to the shortage of help it is slow work. There will be much grain still unthreshed when the winter rains come.

The Loganberry is fast growing in favor here and takes precedence over all others with our growers.

The bean crop is all right and will from present appearances be a good one. There has been a very large acreage planted in this county and the season has been favorable.

Olives are now in full bloom and there are indications for another good crop. This is the principal olive producing county in the state.

Tulare County.

A hog raiser in Tulare is figuring on planting a fig orchard for the purpose of feeding swine on the fruit.

Figs here grow vigorously, yield a certain crop and there is no question of their fattening qualities.

Apple growers in the Springville district are complaining of the ravages of the codlin moth this season. This pest has appeared in increasing numbers this year and the fruit is very much injured by their attacks.

The outlook for the grain crop is not very encouraging. Harvesters are at work and a very large part of the crop is already cut. The only section in which grain is turning out better this year than last is what is known as the Lois district. The Terrabella district will fall nearly half short of the crop of last year, as will also the Roth Spur, Lindsay and the Exeter country.

The first car of new wheat from this section was shipped on June 17th. It was bought by the Farmers' Milling Co. and shipped to Stockton.

Hay baling is in order and a very great part of this work is done. There has been a very fair crop.

The cannery at Visalia will soon start up on peaches and the manager says the pack will be at least as heavy as that of last year.

Apricots have ripened all at once and our orchardists are busy trying to save them.

The raisin crop promises to be a very heavy one this season. There were no late frosts to injure the first crop and the fruit has set very heavily.

The Springville section is now shipping apricots, apples and peaches.

Hay is all baled and is selling at $9.50 to $10 per ton.

J. F. Warren, a Springville stockman, is feeding 200 head of picked cattle for the market.

There has been plenty of mast in the foothills and hogs are in good condition. There have been some very heavy shipments recently, chiefly to Los Angeles packing houses.

Young oranges in the citrus districts have set well and unless there is a very heavy drop during the summer the crop will be the best ever produced here.

Sutter County.

Cherries are all over and apricots are now coming in with a rush. Peaches are also ripening fast and the orchardist has all he can do to keep up with his work.

The almond growers of this county held a meeting at Yuba City on June 20th, at which arrangements were made for marketing the present season's crop on the co-operative plan.

The Sutter Preserving Co. has finished putting up a good pack of cherries and is now running on apricots. A large pack of asparagus and peas put up by this company this season has already been disposed of.

Harvesting is well advanced and being rushed to a finish. There is a fairly good wheat crop in this county and hay, which is now pretty much all baled, was a very good crop.

Farmers here have suffered severely from the depredations of blackbirds, which breed in untold numbers in the tules and swoop down on the grain fields in great swarms.

Many of the orchardists of this county are irrigating. They claim that it pays them well, even with the expensive system of pumping water which is the principal method in vogue here.

Over one hundred people were engaged in the cherry pack in the Sutter cannery and this number is now increased as apricots and peaches are coming in. Every one willing to work can get employment here and yet sufficient help cannot be had.

Yolo County.

What with the harvest and fruit picking, every one here is busy. Help is very scarce and farmers are employing all their families in the field to help take care of the crop.

Fruit is ripening with a rush. Cherries are over and apricots and peaches are on. Both of these fruits are turning out light crops in this section.

The wheat crop is fair only, not nearly so good as last season.

Hogs and cattle are doing well this season and the pastures in Capay valley are full of fat cattle and hogs.

Capay valley retains its reputation as the early corn section of the state.

Several extensive and costly grain fires have occurred here lately. One farmer, J. Rowe of Davisville, lost seventy-five acres of barley.

The Woodland cannery opened on the 21st of June with 164 hands. There is room here for double that number.

Apricots are now pretty well over. The crop has been a fairly good one and a great portion of it has been dried. Peaches are now coming in. The fruit crop as a whole has been good. The Indians are reveling in an abundant crop of wild blackberries.

The grain harvest is now well along and work in this line will soon be over. There has been a severe shortage of hands in the harvest fields and it will be late in the season before all the threshing is finished.

Almond growers report that their crop is turning out better than they expected a few weeks ago.

We are now in the midst of the fruit shipping season and heavy shipments are going out every day. They will be much larger this season than last. So far prices have been very satisfactory.

The grape crop is showing up well and there is no doubt but that it will be one of the best on record, and as prices are very good grape growers are going to make money this year.

There has been a larger planting of grapes here this season than of any other fruit.

Sacramento County.

Fresh fruit shipments are now going east from Sacramento at the rate of twenty-five to thirty carloads daily. The cherry crop is all over and apricots and peaches are now going forward. Fruit shipments from Sacramento have been much heavier this season than last.

Loganberries are now coming in in large quantities. This fruit is steadily growing in popularity and in the early sections is a money maker.

Pears along the river are very badly affected with the pear scab and this disease will materially lessen the shipping fruit.

There has been strong competition among the San Francisco commission men for river fruit this season and a number of them have been endeavoring to secure control of it.

The grain crop in this county has not turned out as well as was at one time expected. A long dry spell while the grain was in the milk, accompanied with drying north winds, has shriveled the grain badly in some fields.

Grapes promise well and it now looks as though there would be one of the heaviest crops of shipping grapes ever grown in this county.

There has been very little warm weather so far this season and as a result everything is later than usual at this time of year.

The California Fresh Fruit Exchange, with headquarters in Sacramento, has changed its name by dropping the "fresh" and is now simply the California Fruit Exchange.

Riverside County.

Over 5,000 cars of citrus fruits have been sent to market from this county so far this season and there is yet about 300 cars on the trees, mostly Valencia Lates. The shipments this season have been about 500 cars in excess of those of last year and prices have been lower.

Orange trees are through the blossoming season and the young fruit is setting for next season's crop. From present indications it will be up to the standard, but it is yet too early to make a good guess.

The desert sections are now in the rush of melon shipments. The melon acreage there has been largely increased this season and so far good prices have prevailed.

Water in the Hemet reservoir is 106 feet deep, which assures abundant water for irrigation in the district which it supplies.

The new Imperial district, lately reclaimed from the desert, on the Colorado river is being given very much to alfalfa and hogs, both of which do well there.

The season has been a very cool one, but hot weather has reached us at last. Fruit of all kinds is ripening fast. The apricot crop all through this section is immense and help sufficient to care for it cannot be had; very much of it will be lost in consequence.

The grain harvest is now under full swing and a phenominal crop is being cut. There is no discounting either the hay or grain crops this season.

Summer irrigation has commenced and water is plentiful this year. As there has been a very limited supply for several years the present season's abundance is welcome.

The honey outlook is not so good as it was a few weeks since. The weather has been very variable and the bees have not worked so well as at the beginning of the season. There will still be a good flow, however.

In the Perris valley the second cutting of alfalfa is being made. This is always a certain crop and a paying one.

Ventura County.

There are nearly 44,000 acres of beans in this county and as the season has been a good one so far there is promise of an immense crop. The stock of hold-over beans on hand is light, so there is also prospect for a good market. It should be a prosperous year for the bean farmers of Ventura.

There has been a large cut of hay this spring, but the farmers are holding out for good prices and refuse to talk of less than $8 in the field.

Heading is in full swing all over the county and a large part of the grain crop is already harvested. The output of grain here is the heaviest in the past fifteen years. It will approximate closely upon 900,000 sacks.

Ventura bean growers have recently filled a big order from the agricultural department at Washington for seed beans for distribution by that department.

The berry crop, both wild and cultivated, is heavy this season and pickers are busy.

The beet harvest at Oxnard has commenced and work at the factory will commence in a few days.

The Whole State.

The creamery proprietors and managers are endeavoring to effect an organization looking to some system in the manufacture, grading and sale of their products. At a recent meeting held at Fresno for this purpose a committee of five on permanent organization was appointed. It is hoped that through organization the difficulties that now cause so much friction between the creameries and the commission men of San Francisco may be overcome.

Some heavy shipments of mules have been made rom Sacramento valley points for the Hawaiian Islands during the past month. These are for service in the sugar plantations of the islands, where the mule has been found superior to the horse for the work required.

The Orange County Celery Growers' Association, according to their last report, shipped during the past season 989,865 bunches of celery, for which they received $149,000, which with the exception of one-ninth of a cent per dozen for office expenses, went to the growers.

The southern California walnut crop is backward this season and will be about three weeks later than usual. The spot, or blight, has affected about one-third of the nuts.

Heavy fogs during the past month have somewhat interfered with the honey flow in the south and the crop will fall somewhat short of what was promised early in the season.

The grain crop of all the southern counties this season is a remarkable one, many growers stating that it is the largest they have ever known.

Continuous and systematic work is being prosecuted against the codlin moth in the apple orchards of the Pajaro valley. At least twice as many orchardists are spraying as were expected and the spraying will be kept up at intervals of ten days through the season.

Grasshoppers are reported as doing some damage in portions of Tulare, Kings and Fresno counties. The extent of damage, however, is not very great.

The fruit and vegetable crop of Nevada county will be unusually light this year, owing to severe May frosts. Pears, apples and peaches are the chief sufferers. Cherries, prunes and oranges are almost a total loss and grapes are also badly damaged.

Kings county will have a very heavy fruit crop, especially of apricots, peaches and grapes. The prune crop is very light—from half to one-fourth a normal crop—but the fruit will be of very superior quality. It is said that Kings county produces about one-fifth of the raisin crop.

State of Washington.

Pierce County.

A. Van Nolderbeke, state commissioner of horticulture, states that the fruit crop of the state will be one of the heaviest ever produced here.

Harvesting has commenced in some of the earlier fields and the grain crop is promising fairly well. It will not be a banner crop, but still a good average.

In some parts of the state stock had a hard time during the past winter, but cattle have thoroughly recovered and are now in good shape again. In this county there was little suffering from cold through the winter, although much feeding had to be done.

Hay has been very scarce and dear until recently and has not come down very much yet. Haying is still on and as a good crop is being cut it will probably come down in price.

Asotin County.

The residents of Asotin county have joined the wool growers in asking Senator Foster to do all in his power to prevent the establishment of a permanent forest reserve in this county, setting aside some 90,000 acres, as is proposed by the interior department.

The Asotin County Fruit Growers' Association has been organized, the membership including a large majority of the fruit growers of the county.

The fruit crop in this county this year is the largest ever known.

There have been some very heavy stock sales in this county recently. Stock is generally in good condition and is selling at 4½ cents on the hoof.

Haying is well nigh finished and a good crop has been cut. Harvesting is now on and wheat is turning out very well.

Whitman County.

Some very heavy sales of thoroughbred cattle have been made here lately. One lot of forty head of thoroughbred shorthorns was sold by L. P. Grimes of Missouri at an average of $100 per head. A carload shipped in by the American Shorthorn Breeders' Association was also sold at a good price.

The season is late this year, but crops are turning out very well indeed. Haying is over and a good cut has been had. Grain is ripening fast and heading has commenced in some of the earlier fields. The yield will be up to average, or perhaps something over.

Fruit in the Palouse section is ripening fast and is one of the best in years.

State Of Oregon.

Umatilla County.

There were very heavy losses of sheep and stock during the past winter in some of the country tributary to this county. Both cattle and sheep have fully recovered now and are looking well.

There has been a very large increase from lambing this spring, averaging over 90 per cent.

There have been some very heavy wool sales here this spring. In one day recently over a million and a half pounds were disposed of at prices running from 10½ to 14 cents.

Milton in this county has developed into the great berry center of the state and shipments from this point have been going forward for some time at the rate of 500 to 800 crates daily. They are shipped to Spokane and Montana principally.

We are indebted to the publishers of Sunset for the picturesque views of Placer county appearing in this number of ORCHARD AND FARM.

MONTEREY, CAL.

MONTEREY COUNTY is sharply divided into mountain and plain, with a very small extent of intervening foothills. The Santa Lucia range of mountains follows the entire coast line. The western slopes of these mountains are quite precipitous and descend rapidly to the sea, leaving in some places a narrow bench of arable land, cut by deep ravines. Probably one-half of the entire area of the county is comprised within this mountain range. On the eastern slope the mountains fall away quickly into the foothills and thence into the great valley of the Salinas, which opens upon Monterey bay on the north, from which it extends in a southeasterly direction for one hundred miles, with a width of from six to fifteen miles, comprising 640,000 acres of agricultural land.

Arable Land.

The arable land of the county is comprised largely within the limits of this valley and its tributaries. Salinas valley is worthy of special attention. Its lands are of three classes—rich bottom lands, table lands and uplands. All of these are capable of producing large crops of cereals. The climate differs according to the elevation. The average yield in the lower bottoms is of wheat thirty-five bushels and of barley sixty bushels per acre. The uplands and table lands are favorable to the growth of fruit. In the uplands or foothills are sheltered valleys, where oranges, lemons, peaches and figs are successfully grown.

Some Potent Facts.

Monterey has:

Balance of trade always in its favor.

Its own lumber, fuel, food, wool, leather.

Great extent, affording choice of location.

Good schools within reach of every home.

Great natural resources in divers branches.

An honest, peaceful, law-abiding population.

Good wages for workingmen in cash each month.

An equable temperature, insuring bodily comfort.

Cheap lumber, making improvements inexpensive.

Abundant rainfall, guaranteeing crops and water.

Good county government, honestly administered.

Cheap fuel, costing little more than the labor of taking it.

Healthfulness, especially the absence of fevers and malaria.

Attained a reputation among drovers for its early and fat cattle, being the first in season in the markets of the state.

The finest potato growing region on earth, producing from 100 to 150 sacks of the famed Salinas Burbanks per acre.

The Salvation Army colony at Fort Romie is one of the most prosperous in America. The success they have achieved can be duplicated by others who will use the same industry and intelligent endeavor.

Salinas, the county seat, is located in a beautiful valley, population 3,500, fine court house, schools, churches, asphaltum pavements, gas and electric lighting system, pure mountain water, a model location for homes.

The largest sugar factory ever built, with a capacity of crushing 3,000 tons of beets daily, all of the beets consumed being raised in this county. The daily cost for beets during the season's run is $12,000, for labor and operating expenses, $5,000. Sixty thousand tons of sugar are produced during the working season of five months.

Monterey county is one of the few places where a man may start in business with a small capital. The more the better, but $500 is enough. This, with frugality, honest and faithful effort, will bring succees.

Health resorts are numerous in Monterey county, some of them being in isolated spots in the mountains, whence natural mineral waters pour forth in abundance. Others are thriving cities, such as Monterey and Pacific Grove, where thousands congregate every month to enjoy the genial climate, ocean bathing, fishing and hunting, for which these justly famed resorts are celebrated.

ORCHARD AND FARM is $1 per year.

FACTS CONCERNING PLACER COUNTY

Pomological Paradise of Northern California

A FRIEND of Governor Stanford, who was invited by him to ride in his private car from Sacramento to the summit many years ago, when the road through the foothills wound in its devious course through tangled underbrush and thick chaparral; when few suspicioned that the unoccupied land over which they were passing possessed any value, told the writer that the governor asked him, as they swung around curves, dashed over fields and whirled through cuts and tunnels, where he thought the eventual future garden spot of California would be found. In reply to his guesses the governor said: "No, we are now passing through what will eventually become a pomological paradise and you will see these foothills the home of a contented, prosperous and happy people—the garden spot and the treasure house of California."

Now as one flies through the same locality on a splendidly equipped train his eye takes in a panorama for miles on both sides of the track of orchards and vineyards, cozy cottages and happy homes, beautiful and prosperous towns, school houses and churches, which tell of the intelligence and progressiveness of the people, all of which proves that the late Governor Stanford had a prophetic vision and that his prophesies are rapidly coming true.

IRRIGATION DAM AT AUBURN, PLACER COUNTY.

Stretching from the east edge of the Sacramento valley, beginning about twelve miles from the state capital, up to the summit of the Sierra Nevada mountains, hemmed in on the west by Bear river and on the east by the American, is Placer county. Its early history is replete with stories of golden harvests, its gold-ribbed mountains and its auriferous river beds having responded bountifully to the persistent activity of its hardy miners, and even at this date it turns into the channels of commerce a million and a half dollars annually. Interesting as was its early history its present is still more attractive, and its golden fruit is already yielding as many gold dollars as its rocks and sands have hitherto produced, with a certain prospect of doubling and possibly quadrupling its present output.

The development of its horticultural resources is a marvel to all who visit it. Commencing at Roseville Junction, fruit orchards are found scattered here and there as far up as Dutch Flat, a distance of fifty miles. Oranges, all varieties of deciduous fruits and berries are cultivated in the western part of the county with the greatest success and are shipped by the carload to the east and foreign countries.

Its foothills are the natural home of the peach, producing a quality unexcelled anywhere in the world. Its oranges ripen a month earlier than the same fruit does in southern California and they are of a quality equal to the best. The towns of Roseville, Rocklin, Loomis, Penryn, Newcastle, Auburn and Colfax, on the line of the Central Pacific railroad, are flourishing and prosperous, a condition due largely to the fruit industry.

It is not the purpose of this article to go into details about the general industries of the county, but to describe briefly certain points of interest, leaving further details to future descriptions.

A GREAT FRUIT CENTER.

The town of Newcastle is situated in the center of the foothills fruit belt and contains the largest packing houses in that part of the state. It is there that fruit growing and shipping first sprang into importance. From the shipment of a few berries in the seventies the business has grown to mammoth proportions. Millions of dollars have been returned to the producers and an era of prosperity has prevailed. More green deciduous fruits are raised and shipped from Newcastle than from any other point in California. The limit as to variety has never been reached. Oranges, olives, peaches, figs, grapes, and in fact all the fruits, flowers and vegetables and grains known to the temperate and semi-tropical zones flourish to perfection. It is a land of homesteads, a place where the residents are contented with the cozy nook they have found and enjoy life in ease and quietude. Citrus and deciduous fruits thrive and ripen early and consequently realize the high prices prevailing in the early markets of the east. Oranges ripen there from a month to six weeks earlier than in the southern part of California and hold their own among the finest varieties grown. These oranges are particularly handsome in appearance, being bright and golden and free from the scale, which sometimes affects the southern fruit, especially where the trees are exposed to ocean fog.

An orange grove in El Dorado or Placer county will, if properly cared for, net the owner $250 per acre. The natural home of the peach seems to be in the foothills, where drainage is perfect and irrigation is practicable. Trees come into profitable bearing in the fourth year from planting and soon after into full bearing, in which state they will continue for an indefinite period. There are trees in El Dorado and Placer counties that have borne fruit continually for more than twenty years. Deciduous fruits grow in El Dorado and Placer counties equally well and sell at the same relative profit as citrus, because of their early ripening qualities and the fresh condition in which they reach the eastern markets. The first cherries of the season sent from California to the east are usually from Placer and El Dorado counties and sell at very high prices. The largest cherry trees in the world are to be found on the ranch of Robert Hector, near Newcastle; some of these trees are sixty feet in height and one of them has produced as much as three thousand pounds of fruit in a single season.

One of the important branches of the fruit industry in Placer and El Dorado counties is the growing of strawberries, which ripen there so early that they are practically marketed without competition and consequently at great profit. Between the trees of a newly planted orchard can be set three or four rows of strawberries, which will come into profitable bearing in the second year and from which three yearly crops can be gathered.

Grapes are successfully grown both for wine and raisins, as well as for the table. The first full carload of raisins shipped from California to the east came from Rocklin, in Placer county.

The olive also flourishes in this section—indeed, the finest olive orchards in the world are situated where the soil, climate and configuration of the country are almost exactly like that of Placer and El Dorado counties. The trees grow with wonderful vigor, bear fruit at an early age and are not troubled with insect pests of any kind. The olive tree commences to bear at seven years of age, from which age the yield rapidly increases with each succeeding year. Trees have been known to live in France and Italy for two hundred years. At Acelia Heights, near Auburn in Placer county, sixty acres of trees ranging from six to fifteen years old produced in one season about six hundred gallons of the best quality of olive oil.

Lemons, figs, pomegranates and Japanese persimmons, almonds, English walnuts, pears, apples, apricots, nectarines, currents, plums and prunes are also successfully grown in Newcastle section. Some of the largest watermelons grown in California are to be found in the vicinity of Roseville in Placer county. The tea plant is also being successfully grown.

The excellent transportation facilities enjoyed by El Dorado and Placer counties have been an important factor in their development, placing the district as regards shipping one day nearer the eastern markets than any other part of the state.

There are ten passenger trains daily through Newcastle and a freight train almost every hour during the busy season. Placer and El Dorado counties have aptly been called the "homeseekers' paradise." The development of these counties is, comparatively speaking, in its infancy and there is still room for thousands of energetic and capable men. To such men this section presents many and great inducements and extends the hand of welcome. Experience has shown that the productive quality of the soil is practically unfailing and inexhaustible so long as the tiller does his work and properly cultivates it.

A Splendid Opportunity.

Located about six miles east of Newcastle in El

Dorado county and just across the American river from that town is a fine 1,000-acre tract that has been placed on the market for colonizing purposes by the Holmes Lime Company of 24 Sacramento street, San Francisco. This land is rolling and all susceptible of being brought to the highest state of cultivation. It was originally covered with a heavy growth of pine timber, but is now cleared and ready for immediate cultivation. The land is especially adapted to the cultivation of olives and table grapes, as both these fruits can be successfully grown without resort to irrigation. The grapes grown on this soil have a flavor and color seldom found in California, which, added to the earliness of ripening, enables shippers from the locality to get the highest price in the eastern markets. Some of the first Tokay grapes shipped from Newcastle have sold at a price equivalent to $500 per ton in the New York market. A small vineyard adjoining the land of the Holmes Lime Co. yielded $250 per acre in the fifth year.

The soil is rich and can be brought into a state of cultivation at small cost. The grapes both for table and wine can be grown from cuttings, which will bear the third year after planting. The cuttings can be planted between the rows of olive trees, thus giving an income from the land while the olives are coming into bearing. Chicken raising is a very profitable industry in this locality and the entire living expense of the rancher and his family can be realized from this source while the vines and trees are coming into bearing.

Lumber for building and fencing can be procured direct from the mills. There is a great demand for help in the orchards and packing houses and a substantial sum can be derived from this source while the young trees and vines are unproductive.

The proposition of the Holmes Lime Company is to furnish the land in tracts to suit, from twenty acres and up, the purchaser to prepare the land and plant the vines and trees and care for same in a thorough manner for a period of three years, at the end of which time the company will give purchaser a deed to one-half of the land so planted and cared for. Here is an opportunity for a family of small capital to procure a bearing orchard at the expense of planting and caring for the same only. The property at the end of three years will be worth from $100 to $150 per acre and will have cost not to exceed $70 per acre. A home will have been obtained in a sunny district, a land of flowers, where there are no damaging frosts and no blizzards, and where the geranium and heliotrope bloom the whole year round.

The climate in and around Newcastle is the finest in California and the climate of California is admittedly unsurpassed in the world.

CITRUS COLONY CLUB HOUSE, PENRYN, PLACER COUNTY. Courtesy of Sunset.

A Promising Town.

Loomis is on the line of the Central Pacific railroad, twenty-five miles east of Sacramento. It is in the most extensive fruit belt in the county, and although it is yet young in development compared with other shipping towns along the line, it has shipped fruit aggregating from $300,000 to $400,000 a year, which justifies the prediction that when its orchards get into full bearing it will become a very important town of the county. Its population as yet is but 200. It has many cozy homes, some of the fruit farms having dwellings that would be a credit to any city.

Ideal Residence of St. C. Pendleton.

A house recently completed two miles east of town is an instance of the pride residents take in their county and as it is the beginning of a country home a cut and a description of it is herewith presented. It was finished in March of this year and the work of clearing the 160 acres of land on which the house is built has been going on less than a year. It is the property of Mr. and Mrs. St. C. Pendleton.

The house is built on a hill near the center of the tract and is the most sightly place in the northern part of the state. From the building points can be seen in Solano, Lake, Sutter, Nevada, Placer, Sacramento and El Dorado counties. The electric lights in the capitol building at Sacramento can be seen at night and the snow-capped mountains of the summit are plainly visible, as is the Sacramento river for a distance of twenty miles, while in every direction orchards and homes are presented to the eye, affording a panoramic view seldom equalled.

Four thousand cling stone peaches were planted this spring and the coming season eight thousand more cling stone trees will be set, all of the choicest varieties, which it is believed will make the largest cling stone peach orchard in the state. While such an orchard will be beautiful the proprietor is looking to the commercial end of the enterprise. From one tree on a neighboring farm as high as 500 pounds of peaches have been picked. Assuming that one-third of that yield will be a fair average, it will be seen that the annual production will be in the neighborhood of 2,000,000 pounds, or 1,000 tons. As $20 a ton is the lowest price ever received and $65 per ton the highest price, the reader can figure it out to suit himself.

Under the hill or ridge on which the house stands there runs an ancient river gravel channel, a small part of which has been worked and paid largely. A well seventy feet deep has been sunk down through this channel, striking a large flow of pure water, which has evidently followed it down from the higher mountains above. A windmill elevates the water to a tank on the hill higher up, pipes from which conduct the water to the house and barn for drinking and culinary purposes. A reservoir on the summit of the hill is approaching completion which has a capacity of 80,000 gallons. Water for this is to be pumped from the South Yuba Water Company's ditch, lower down the hill, and pipes will conduct it to every part of the ranch for irrigation.

RESIDENCE OF ST. C. PENDLETON.

The residence has ninety feet front and a depth of fifty feet and is divided into nineteen rooms, all arranged in accordance with a model of a summer residence at Bar Haven, Connecticut. Ornamental shrubbery, flower terraces and twenty varieties of shade trees are planted around the house, and when well started and lawns laid out according to adopted plans, the place will be a model in construction and beauty. Two electric wires lead from the main line to the premises, which will afford power for pumping and for lighting.

Altogether the place will be the most attractive of anything in northern California and will be a source of pride to all residents of Placer county, as well as to the owners.

Viticultural Experiment Stations.

ORCHARD AND FARM some time since gave an account of the intention of the department of agriculture to establish in this state two experiment stations to be devoted to viticultural work, under the direction of Prof. George Husmann, one to be established in Napa county and the other at Fresno. Prof. Husmann, in writing us in relation to this matter, says:

"Several articles having appeared in publications on the Pacific coast regarding the experimental vineyards recently established by the United States department of agriculture in California, which may lead to a misunderstanding by the general public of the exact purpose and scope of viticulture work of the department of agriculture on the Pacific coast, I would like to make the following statement for the benefit of those interested in viticultural matters. Two experimental vineyards have been established by the department, one at Oakville, Napa county, and the other at Fresno, Fresno county, Cal., in connection with the general viticultural appropriation bill. In these vineyards it is proposed to bring together for observation and test all the known resistant stocks of the world which will give any indication of value to the American vineyard grower, for the purpose of determining their adaptability to Pacific coast conditions and their congeniality to the improved commercial varieties of vinifera grapes grown in this country.

"Incidentally it is also proposed to assemble as complete a collection of the vinifera grapes of all countries as can be procured with a view to correcting the existing confusion in nomenclature of varieties and determining the adaptability of these varieties to localities and their value for different uses."

Mr. Husmann goes on to describe more in detail the proposed work, and says: "The direction and management of these vineyards rests entirely with the department of agriculture, though in certain phases of the work of investigation the California experiment station has agreed to co-operate with the department.

"The growers of the state may therefore rest assured that all phases of the work will receive thorough and careful investigation by the department and that all that can be done through systematic investigation will be accomplished.

PACIFIC

"GEORGE C. HUSMANN,
"Expert in Charge of Viticultural Investigations."

PUMP IRRIGATION IN CALIFORNIA VALLEYS

A Complete Exposition of it by Orchard and Farm.

IRRIGATION by pumping has recently been adopted to a surprising extent in California, with quite remarkable results which have surprised and enthused many who have practiced or observed this method of supplying water to ranches, orchards, vineyards and gardens which need it. Several thousand pumping plants have been installed throughout the valleys of the state, mainly within two or three years and largely within the past year, yet only a beginning has been made in the adoption of this form of irrigation.

Pump irrigation has, of course, been practiced in the world for thousands of years, and in Kansas and Nebraska pumping for irrigation with windmills has been widely adopted in recent years and been extensively reported upon by the Department of Agriculture. But this is practically a new feature of the industry in California, as far as its general adoption is concerned, and the subject has never here been comprehensively and intelligently discussed.

Reservoir and ditch systems, of course, will remain the great feature of irrigation here, but the possibilities of pump irrigation are enormous and the people of the state are just beginning to realize the vast source of wealth they possess in underground and flowing waters that can cheaply and easily be bestowed upon adjacent lands.

Throughout the length of the Sacramento and San Joaquin valleys, in fertile Coast Range valleys, and in large portions of southern California, pump irrigation can be and is economically employed. Pumping must be governed by local conditions and these widely vary. In the Fresno district pumping from wells and sloughs supplements the ditch supplies and, in cases, has superseded them. Wells are largely relied upon in Kern county. The rich citrus belt of Porterville is irrigated by pumps operated electrically. Nearly half the irrigation of southern California is now by pumping. Throughout the Sacramento and San Joaquin valleys orchards, vineyards and gardens are rapidly being supplied with pumping plants, drawing water from shallow wells or rivers with enormous benefit to crops, increasing yield and quality.

There has thus recently developed a widespread boom in this form of irrigation and its development, practice and possibilities throughout the state are now being thoroughly and intelligently investigated by ORCHARD AND FARM and the results will soon be given in a great special edition that will be one of the most elaborate, interesting and valuable special publications ever devoted to the exploitation of California's industrial resources.

This edition will describe the conditions in all districts which economically favor this form of irrigation, present the results that have been reached so far and state the possibilities thus demonstrated. There will be given an extensive array of facts and figures dealing with costs of plants and of operation, types of pumping and power plants, sources of water supply, etc., and to this end a vast amount of correspondence is being carried on with intelligent users of pumping plants in all districts. A great many engineers and others who have expert knowledge of the subject are contributing information and there will be given special papers by government irrigation experts, hydraulic engineers and others who are taking a deep interest in this work. During this month the leading irrigation districts will be visited for special study at first hand.

The result cannot fail to be a publication that will comprehensively treat all phases of the topic, supplying for a long time to come just the information that people interested in pump irrigation need and seek. It cannot fail to greatly stimulate this great aid to the industrial development of California.

The edition will be at least 10,000 copies and it will be read by thousands of orchardists and ranchers and by thousands who are studying the desirable districts of the state and their possibilities. The enterprise has received the warm welcome and cordial co-operation of leading Californians everywhere who are interested in the welfare of the state.

Mr. J. A. Filcher, secretary and general manager of the State Board of Trade, has long been an enthusiastic advocate of pump irrigation and takes a deep interest in this forthcoming edition. He has expressed his approbation in the following letter to ORCHARD AND FARM:

SAN FRANCISCO, CAL., June 10, 1903.

PUBLISHERS ORCHARD AND FARM,
San Francisco, Cal.

Gentlemen: I learn with pleasure that you contemplate giving in your journal an exposition of the results and possibilities of irrigation by means of the pumping plant throughout the valleys of California. I have always considered that the proper development of this idea meant much for California and I am pleased to know that you propose to exploit this subject thoroughly in your journal. I think with proper encouragement progress in this line will be rapid and result in great benefit to the state.

The State Board of Trade will be glad to include this number in its literature distributed through the mail and at its headquarters in San Francisco.

Trusting that those interested will find pleasure in promoting your efforts along this line, I remain,

Yours very truly,
J. A. FILCHER,
Secretary and General Manager

The officials of the California Promotion Committee appreciate fully the importance of this effort of ours and the value of the edition in attracting colonists to the rich regions where this cheap form of irrigation may be employed, and have testified their appreciation as follows:

SAN FRANCISCO, CAL., June 10, 1903.

PUBLISHERS ORCHARD AND FARM,
San Francisco, Cal.

Gentlemen: I am glad to learn that you contemplate an edition of ORCHARD AND FARM showing the comparative values, etc., of pumping plants in California and the methods of irrigation in connection therewith.

I believe such an edition will be very valuable to everybody in rural districts and we shall be glad to assist in distributing it through the committee

Yours very truly,
RUFUS P. JENNINGS,
Per HAMILTON WRIGHT, Executive Officer.
Chief, Publication Bureau.

Mr. J. W. Mills, manager of the southern California agricultural experiment station of the University of California, at Ontario, writes in the course of a letter to ORCHARD AND FARM as follows:

"I believe that the publication of such information as you have in view will show to the people of the farming districts of the state who do not appreciate the benefits of irrigation what can be done by the proper application of water. It is the key to the highest grade of farming in this state."

Mr. L. W. Taylor, secretary of the board of trade of Suisun, writes:

"This subject is certainly an important one and you are doing the state a great benefit when you bring its discussion before the people. There are undoubtedly thousands and thousands of acres of land in California either barren or farmed at little or no profit which could be made to yield most abundantly by this method of irrigation—land where no other form of irrigation is feasible."

CALIFORNIA'S BOOM

THE agricultural and horticultural industry of California is undergoing the most rapid expansion in its history as a result of a great influx of people from the east and elsewhere and as a result of the spirit of life and enterprise that characterizes the time and stimulates progress and improvement along all lines. The present era of prosperity and the widespread turning of the world's attention to California, as a result of certain great events, are the basic causes of the present industrial expansion, but it is greatly stimulated and directed by particular influences and the most powerful of them is unquestionably the California Promotion Committee, the remarkable work of which is becoming fairly well realized throughout northern and central California.

The magnitude of the work is fairly well indicated by some figures for June, furnished by Secretary Hess and Hamilton Wright, chief of the publication bureau. Last month the committee received 2,443 written inquiries about California, making 23,922 since the work was begun in August last. There were sent out 1,940 written answers to inquiries, making a total of 24,852, and 2,500 miscellaneous and circular letters. In June there were distributed by mail and otherwise 48,819 pieces of literature, making a total of 361,298. The effect of this enormous amount of advertising matter will be felt for years, but this measures but a portion of the work of the committee in stimulating and directing immigration and investment. Last month the committee secured the addresses of 7,556 people interested in California, giving the committee a total of 50,429 such addresses. These addresses are from practically every state and territory and from many foreign countries. States east of the Mississippi river furnish the most addresses and the present immigration is undoubtedly from these states in a corresponding ratio, thus affording a high and desirable class of Americans as colonists. New York leads the list with 4,500 such addresses and sixteen states furnish more than 1,000 each, in the following order: New York, Ohio, Pennsylvania, Illinois, Indiana, Missouri, Iowa, North Carolina, Michigan, Texas, Virginia, Minnesota, Kansas, Wisconsin, Nebraska, Massachusetts. A very great number of people call at the committee headquarters in San Francisco for consultation, information and advice and the influence of the committee is exerted in a great variety of ways.

The actual results of the work can naturally be but vaguely measured. It cannot be told how many of the 50,000 or more people who have come to California on the colonist rates of last spring have or will remain to labor or invest in California, but general reports from all the over the state, particularly the best advertised and most desirable portions of the Sacramento, San Joaquin and Coast Range valleys, show a very rapid settlement of new people who are largely going into fruit raising in small tracts.

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TO THE MAN LOOKING FOR A

Permanent and Profitable Home in California

No section presents a more formidable array of inviting statistics and natural resources than does

...HUMBOLDT COUNTY...

THE county is one of the most prosperous in California now, and the fact that railroad construction is at present under way, which will open up thousands of acres of excellent land for settlement, is one which will at once appeal to those looking for homes.

Humboldt County has an area of 2,244,480 acres and its coast line extends over 100 miles in length.

Humboldt County has magnificent lumbering interests, this being one of the few places where Redwood timber flourishes. The timber land area is 930,000 acres and the shipment of lumber from Eureka, the principal seaport and county seat, footed up 201,172,613 feet in 1902.

Dairying is one of the principal industries of Humboldt county and butter from that section commands the highest market price in San Francisco and other centers. The shipment of butter for 1902 was 5.614,692 pounds. The returns from this industry amount to about $100,000 per month, distributed among owners of dairy herds, and the result is that there is no more prosperous section on earth than the dairy section of Humboldt county.

In the essentials peculiar to cereal farming Humboldt stands second to no other section in the temperate zone.

Humboldt has the banner record for the production per acre of oats and corn, according to the U. S. census reports. At the Chicago World's Fair, wheat grown "on the hills" of Humboldt took first prize and showed the record yield per acre—from 60 to 100 bushels for various samples. All the other crops customary to temperate climes grow in like proportion.

And all this without irrigation, for it must be borne in mind that as an adjunct to agriculture the irrigating ditch is unknown in Humboldt. The principal agricultural crops are hay, oats, potatoes, peas, barley, wheat, corn, lentils, seeds, etc. Failure of crops is absolutely unknown.

Land prices are remarkably low in Humboldt county and the man of moderate means can here find a safe investment.

Stock raising, wool growing, horticulture, mining and fishing are also carried on extensively and profitably.

OAT FIELD YIELDING 75 BUSHELS PER ACRE IN HUMBOLDT COUNTY.

HUMBOLDT HAS:

Great extent, affording choice of location.
Cheap lands in abundance.
Good wages for workingmen, in cash each month.
Its own lumber, fuel, food, wool, leather.
Cheap fuel, costing little more than the labor of taking it.
Equable temperature, insuring bodily comfort.
Healthfulness, especially absence of fevers and malaria.
Diversity of products, giving variety in occupations.
Abundant rainfall, guaranteeing crops and water.
Great natural resources in divers branches.
Balance of trade always in its favor.
Cheap lumber, making improvements inexpensive.
Good schools within reach of every home.
Good county government, honestly administered.
Cheap freight rates by sea to all Pacific ports.
The largest and best body of redwood on earth.
An honest, peaceful, law-abiding population.

IT HAS NOT:

Chinese to compete with American labor.
Irrigation, with its expense and litigation.
Spanish grants to cloud titles and bar settlement.
Railroad land grants to interfere with progress.
Codling moths to destroy the apples.
Colorado beetles to destroy the potatoes.
Long winters when stock must be fed.
Severe frosts to destroy vegetation
Crop failures from any cause whatever.
Summer thunderstorms to interfere with harvests.
Cyclones, blizzards, tramps or strikes.

IT NEEDS:

Capable, energetic settlers, who mean business.
More manufacturers in nearly all lines.

FOR PARTICULARS WRITE TO

HUMBOLDT CHAMBER OF COMMERCE

EUREKA, CALIFORNIA.

YUBA COUNTY, CALIFORNIA

A Healthful Location. Surpassing Climate. Fertile Soil. Abundance of Water.

SUPERIOR ADVANTAGES FOR THE HOMESEEKER.

YUBA COUNTY, CALIFORNIA, one of the earliest regions on the coast to attract a population, is located 125 miles north of San Francisco on the eastern side of the great Sacramento valley and runs to the north and east well up into the Sierras. Its area is 625 square miles and its population approximately 9,000. The principal town and county seat is Marysville, located at the junction of the Yuba and Feather rivers. Another important town is Wheatland, located near the southern boundary of the county. The soil is extremely fertile and varies in character from the river bottoms to the foothills, being adapted in its different natural belts to the growth of deciduous and citrus fruits, olives, berries, semi-tropical fruits, almonds, walnuts, and the cereals. Much of the land needs no irrigation and where this is necessary or beneficial water can be had in abundance and at little expense. The climate is favorable for vegetation and the rainfall generous and so distributed as to make crop failure an impossibility. Farming and fruit lands are reasonable in price and are located so that the railroads are within easy reach.

To the south and tributary to Wheatland, along the banks of the Bear river, stretching from the low hills of the Sierra Nevada mountains on the east to Dry creek on the west, are the fertile lands of the Bear river. Here are located the largest hop yards in the world. The lands in this vicinity are especially adapted to the needs of men with a moderate capital.

Among the industries of Yuba county, in addition to the agricultural and horticultural pursuits, are flour and woolen manufacture and fruit canning. The Marysville Woolen Mill has been in operation for nearly four decades and during that time its trade mark has been recognized as a guarantee of quality and durability. The mill has a capacity of nearly half a million yards of cloth a year It furnishes a home market for the wool growers of this and adjacent counties.

A SCENE NEAR MARYSVILLE.

The Marysville Canning and Packing Company is another institution of great importance in the industrial life of Yuba county. Its pack is known and sought in both Europe and America. Located as it is in one of the finest fruit regions on earth, with its intelligent help and skilled superintendence, there is every advantage for a first-class output. It furnishes employment to nearly a thousand people during the season, which lasts about five months, and a sum aggregating nearly six thousand dollars per week is put into circulation. This employment has been of especial benefit in tiding many an individual over the long period of waiting while the vineyard is maturing or the orchard coming into bearing.

Located at Marysville is also the Buckeye flour mill of the Sperry Company, one of the largest flour corporations in the west. It furnishes a readily accessible market for the wheat grower in this vicinity. The mill was destroyed by fire last year and has now been rebuilt. The present structure is a handsome one and is provided with modern machinery capable of turning out 600 barrels per day. Outside of this state the orient is the chief consumer of the flour.

The city of Marysville is well provided with fine business houses, both wholesale and retail, where not only provisions and drygoods, but also hardware and agricultural implements may be had at prices as cheap as in San Francisco. The stores are attractive and up-to-date and stocked with a variety unsurpassed in the larger cities. Marysville is the natural distributing point for a large territory to the north. There are three banks doing business in the city and one at Wheatland and the large deposits constantly on hand furnish a striking proof that farming pays in this section.

The now celebrated Bay Counties Power Company originated in Yuba county, where part of its electricity is still generated. It furnishes power and light to the chief cities in northern California. Power is also furnished to the farmers of the county for irrigating, pumping and various other purposes.

From a religious and educational point of view Yuba county will compare favorably with any other section in the United States. It has a fine system of public schools culminating in the Marysville high school, which bears a splendid reputation and is accredited at the state university. Both Marysville and Wheatland are well equipped with churches of various denominations. In Marysville also is located the old and excellent convent of Notre Dame, well known throughout the state. Marysville has a fine public library for the accommodation of which a substantial new $75,000 home is soon to be erected. The buildings of Marysville are substantial and handsome and its business streets paved with basalt and asphaltum and lighted by electricity. Its attractive homes are generally surrounded by beautiful gardens.

The wagon roads of the county leading to the various shipping points are kept in fair condition the year round, thus avoiding as far as possible the loss of time during the busy season.

Those engaged in growing oranges in Yuba county possess, in common with the people of the northern and central portions of the state likewise employed, one great advantage over their southern competitors. Their fruit, which is of equal quality, ripens from four to six weeks earlier, making it possible to reach the eastern market in time for the November and December trade, thus assuring much higher prices than can be obtained later in the season. The somewhat greater heat of the nights of summer and fall is the cause of the earlier maturity.

With all the advantages which present themselves, there seems an exceptional future of prosperity for the investor in Yuba county. Whether it be mining, lumbering, stockraising, agriculture or horticulture, whichever may suit his calling, each man may choose for himself from nature's bounteous storehouse. If you are looking for a home Yuba county is well worth investigating.

A FARMER living nine miles north of Marysville relates his experience as follows: "Some years ago as a result of a policy of planting my whole place in cereals it ceased paying; soon there was a mortgage and this grew apace until I thought of relinquishing the land altogether. On the advice of a friend, however, I determined to put a portion of it into fruit and almond trees and I now have about twenty-five acres in fruit. Six years ago I planted ten acres to almonds and last year I received in cash for the crop from this patch $1,745.50, or an average of $174.55 per acre, which cleared me in the neighborhood of $1,300. While my other trees did not do as well as this, the entire place footed up a very satisfactory aggregate."

Persons desiring reliable information regarding Yuba County will be furnished with the same on application to the

CHAMBER OF COMMERCE, MARYSVILLE, CAL.

THE WOOLLY APHIS IN THE PAJARO VALLEY.

By C. H. Rodgers of Watsonville.

THE woolly aphis is so well known to our orchardists that a description of its appearance is unnecessary. It is present in every apple district on earth and in every orchard in our valley. Its widespread presence in our valley is due to criminal carelessness and greed of the nurseryman and ignorance and indifference on the part of the orchardist.

Some peculiar and erroneous ideas exist regarding this insect. Some of our orchardists believe that it has its origin in the ground and is indigenous to our soil. Others believe that it originates in the sap of the trees and hence its appearance on the wounded parts. While oftentimes outside of orchards the plow turns up what at a casual glance has the appearance of woolly aphis, close inspection will prove that it is not such.

Since its host plant is almost exclusively the apple, although occasionally seen on the pear, it is safe to say that this insect was brought into our valley on nursery stock.

The injury caused by this pest is manifold. It punctures root and branch and inserts a poison which causes warty growths or knots, thus interfering with the free flow of sap. It impoverishes the tree by sucking out the life fluid. Each aphid is a minute pump constantly at work. One of the favorite points of attack is at the axil of the leaf and fruit stems. The injury soon becomes apparent at this place by the dropping of leaf and fruit. Oftentimes trees, particularly Bellefleurs, are almost defoliated by these attacks and the so-called June-drop of apples doubtless is largely due to this insect. Both leaf and fruit buds for the following year are formed at the axils of the leaves and these buds, if not destroyed outright with the leaf, are often so badly injured as not to develop during the following year. It will thus be seen that one severe attack may ruin two crops. Through loss of leaves, the lungs, there is inadequate aeration of the sap or blood of the tree. The result of impoverished, innutritious sap is a sickly tree producing immature, insipid, unattractive apples. With the two leading varieties of apples grown in this locality the damage from woolly aphis is greatest to the top of the Bellefleur and to the root of the Newtown Pippin.

The extent of damages to the top has already been explained and is familiar to many orchardists, but few realize the extent and gravity of root infestation. Here the feeders of the tree are attacked and so crippled and distorted as not to be able to properly perform their functions. The greatest damage wrought, however, is at the crown of the root just under the surface of the soil. At this point great knotty stools are often formed, entirely circling and sometimes twice the diameter of the stem or trunk. The result of this condition is a strangled, stunted, unprofitable tree.

As an illustration of the extent to which these insects spread underground the writer has traced them on roots a distance of twenty-five feet from the tree.

Although a serious menace to our leading industry, by intelligent care the pest may be kept under control. Beneficial insects, together with a cool, moist climate and nearness of the water table to the surface, all favor us in withstanding the pest. On account of our cool, moist climate there is but little loss of juices of the tree through evaporation and for this reason the tree does not suffer from attack as severely as in warm, dry climates. The nearness of water to the surface makes it possible for the tree, through its roots, to replenish lost juices much quicker than if it were a great depth to water.

PREVENTION.

In setting out an apple orchard plant only trees grown on resistant roots if it is possible to procure them. If these cannot be obtained then plant only clean stock. Upon receiving trees from the nursery thoroughly wash off all dirt from the roots and dip the whole tree into any good insecticide which kills by contact. As the strongest solutions are not required to kill the aphis, it is advisable to dilute most washes somewhat as a precaution against possible injury to the tree roots. The lime, sulphur and salt wash, lye, kerosene emulsion, strong soap suds, a decoction of tobacco, or any of the proprietary compounds are suitable for this bath.

After planting keep the aphis off of the young trees by applications of any of the above named insecticides to any colonies that may appear. It seems reasonable to suppose that if this plan is faithfully carried out for the first three or four years the most dangerous points will have become invulnerable, as the bark on the main branches, stem and root-crown will have grown so thick and hard as not to be subject to attack.

The insect can be controlled at all times by spraying with proper insecticides, or it can be reduced by water alone, if applied with force.

For root form the following substances are recommended and are to be applied at the base of the tree: Ashes, gas lime, tobacco, carbon bisulphide, water at a temperature of 150 degrees.

BENEFICIAL INSECTS.

By the introduction and protection of aphis eating insects we can reduce the pest to a minimum. Of this class the best known and most common are the ladybird, lace-wing fly and syrphus fly. There are other insects which probably feed on the aphis. Some of these are under observation and it is hoped that a favorable report will soon be made concerning their value in this respect.

We are not sufficiently familiar with the habits of the lace-wing and syrphus flies to know how to give them protection and encourage their multiplication. With the life history of the more common aphis-eating ladybirds, the convergens and ambiguous, we are more familiar. If properly cared for these probably would increase in sufficient numbers to keep the aphis in check. Contrary to general belief the ladybird does not hibernate through winter, but remains active and breeds during the whole year if its food is plentiful. During winter and spring, while the aphis is scarce on the trees, the ladybird feeds on a minute insect parasite of burr-clover and other native grasses and weeds. If each and all orchardists would plant or leave patches or strips of these grasses through the orchard as a feeding and breeding ground for the ladybirds, the woolly aphis question would at least not be as serious as at present.

But as with all other problems which confront our orchardists, individual effort meets with discouragement and not until after all, realizing the necessity of co-operation, determine to stand together and strike together, can we expect to better existing conditions.

Weeds Rich in Nitrogen.

Some kinds of weeds will only grow on very rich soil. Of this class is the common purslane known as chickweed or pigweed and usually found in gardens. It makes an excellent feed for hogs when confined in pens and they eat it greedily. These weeds contain a large proportion of nitrogenous matter and rot rapidly when entirely covered by soil. But their roots catch so easily on upturned soil that it is safest after uprooting them in the garden to throw them to the pigs. Another weed that is rich in both nitrogen and potash is fireweed. It is a coarse-growing plant with rough, prickly stem, which springs up after fires in the woods. Horses will eat it, but we never saw it eaten by any other kind of stock.

ORCHARD AND FARM is $1 per year.

Racing for the Redwoods.

The northern coast redwoods are very much in evidence these days in the rivalry of competitive railroads. Through all the years in which railroads have been operating in this state the redwood belt has been treated with indifference by their managers and promoters. This year, however, they are taking a very lively interest in the belt and the race is on in earnest to secure a commanding position for their respective lines within its borders.

It started with the recent ripening of the plans of the Santa Fe and the revelation that the corporation and its agents had acquired control of large tracts of the redwood forests in the northern coast counties and in local railroads and was actively preparing to put into practical shape the surveys which its engineers had been able to complete without attracting attention in any quarter. Later it was ascertained that the Great Northern had designs upon the belt, that corporation having been secretly preparing for months to invade it from the north. The Southern Pacific Company has since evinced a lively interest in this forest region and is still striving to reap a share of the harvest of freight-carrying it promises to yield in future. During the past few days, also, the California Northwestern has been aroused into activity and an auxiliary corporation has been created to enable it to extend its main trunk line through the timber belt northward to Humboldt bay. Much speculation has been indulged in of late concerning the future of this railroad. At one time it was supposed to have fallen into the hands of the Southern Pacific, but later developments proved this to be erroneous. Subsequently the Santa Fe was believed to have secured control and was arranging a connection at some point between Willits, the present northern terminal, and Humboldt bay, the joint traffic of both companies to be carried over its tracks to San Francisco bay. This is, however, disclaimed by the Santa Fe managers, who profess to be seeking an independent outlet for their line on San Francisco bay, regardless of the fact that it will parallel the California Northwestern's tracks, representing that there is traffic enough in the territory occupied for both railroads for an indefinite period. The indications are strong therefore that the northern coast counties, which have been neglected so long by the land transportation companies, will soon be the theater of unusual railroad activity and that they will be gridironed from one end to the other.

The reason for all this sudden competition among the transcontinental and other railroads for a position in the California redwoods is plain. Lumber is growing in value all over the country. The forests of the eastern and midwestern states have disappeared. The east looks to the Pacific Coast for its future supply. Redwood is high in favor there. It is in demand for all purposes to which soft woods are devoted and it has a wider range of usefulness than any other soft wood grown. The transcontinental railroad companies realize that they have in these redwood forests therefore a ready stock of profitable freight available from the date of the opening of any track penetrating them and that the business cannot be exhausted in a hundred years to come. Under such conditions and with such prospects ahead it is no wonder that they are racing to occupy the field.—San Francisco Chronicle.

One is master of the situation who does everything in its own proper time and is never crowded into slighting his work.

A great many farmers say they have no time to read. That is just the reason, as a rule, why they do not succeed better. The man who don't read may be a hard worker, but he is apt to have poor judgment. A look over the country will convince any man that the successful farmers are invariably the most intelligent ones; you might as well think of running a ferryboat over the river when the river is dry as to make a man intelligent who does not read.

Be economical in every phase of poultry raising, but remember that "good stock at any price" is better economy than scrub stock for nothing.

Chicks as soon as weaned will all crowd into one coop if left to themselves, jamming it full.

"MORE PEOPLE WANTED"

KERN COUNTY, CALIFORNIA

IT IS A GOOD PLACE FOR HOMESEEKERS

It has been amply demonstrated that in area, ease of development and output, the oil fields of Kern county far exceed those of any other portion of the United States, and their growth and development presages a future for Kern county brilliant beyond conception.

****

The Kern river not only supplies water for the great irrigators—it is the source of power for an extensive electric generating plant.

****

The Kern Delta presents to the eye a most beautiful, abundant and varied growth of vegetation. The soil is of a rich alluvial character, adapted to the growth of all vegetable life. Without fertilization of any kind, except the water from the Kern river, these lands will produce from six to ten tons of alfalfa hay per acre, cereals, fruits and other products in proportion, and raises for the market wheat, barley, corn, apricots, peaches, pears, prunes, plums, nectarines and apples.

****

Kern county ships more horses, mules and cattle than any other county in California. Sheep and swine are raised extensively, and form an important factor in the live stock industry. Approximately 50,000 head of wild cattle are brought here annually from the outside ranges of Arizona and Mexico to be fattened on alfalfa.

In regard to stockraising and dairying, here are a few facts worthy of consideration: It takes three acres to support one cow in Illinois, but in Kern county one acre of good alfalfa will easily support two cows. Expensive barns and houses for live stock are unnecessary, and the mild climate, diversified products and extensive mountain ranges make Kern county a paradise for the stock-raiser.

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Kern county has the largest artesian wells in the state. Artesian flows are obtained from 125 to 400 feet from the surface. Under almost the entire acreage of Kern valley there is a body of never-failing water at a depth of 8 to 60 feet.

****

Twenty acres of land here, in diversified crops, well irrigated, will give one man all he can attend to, and supply him with an abundance. In Kern county may be raised any of the semi-tropic fruits. The region along the base of the foothills produces some of the best oranges grown in California. Peaches, prunes and all stone fruits grow to perfection, and in the sandy loam of the plains grapes of every variety flourish abundantly. Apples are grown in the mountain sections that rival those of Michigan or New York.

HOUSEHOLD AND FIRESIDE

Summer Styles in Dress and Headgear.

In the summer styles long, flowing lines, sloping shoulder effects, quaint collars and berthas are extremely picturesque, and never before have materials lent themselves with such grace to the fashionable modes. The changes are most conspicuous, perhaps, in skirts. Some are straight and full, being shirred into the belt and falling full from that point or from a hip yoke that is the result of shirring, while others merely show a suggestion of fullness. Hip yokes or empiecements, front panels, folds, flounces, plaits, tucks and gores are all employed, as best suits the wearer and material used. One of the features of the season is the extraordinary diversity of skirt designs.

The street and pedestrian skirts have kept their trim lines and as a rule have a wide flare at the bottom. "Just to escape the ground" is the edict of fashion regarding the proper length of these skirts. A box-plaited flounce lengthening a five-gored upper part makes a new mode unusually attractive, while a graduated tuck at each seam lends variety to a seven-gored walking skirt that is alike suitable for rough woolen goods and for heavy linens.

The shirt waist and separate blouse show some pretty new designs. They are made of sheerest lawns and mulls, of heavy vestings and silky linens and also of light-weight cloth and plain and figured woolens, and each may be fashioned in a style adapted to the texture of the fabric. Severe or tailored effects, the result of stitched plaits or tucks, are used for the heavier materials, while shirrings or tucks alternating with insertion and all-over lace are introduced in the more dressy modes of silk and sheer stuffs.

There is unusual grace in the cape collar, in round or pointed outline or suggesting the sailor modes, which supplements a bodice that may have a high or open neck and full or three-quarter length bishop sleeves. Lace banding and medallions are suggested to trim this pretty bodice.

The picturesque effects of this season's fashions are due largely to the treatment of the shoulder and neck. Nothing so distinguishes even the plainest costume as a pretty collar, stock or other dainty adjunct, and the variety from which to choose is great. Femininity of long ago is recalled in the demure Puritan capes and collars that occupy so important a place in the present styles; indeed, no gown or wrap is complete without one of these accessories and even the bolero, an old-time favorite, now appears with this mark of distinction and may be made of the same material, lace or embroidery trimmed, or may be itself of lace and removable.—The Delineator.

The following poem, under the title of "Fate," has been floating around the press for years with "anonymous" appended. The Critic says that the author is Mrs. Susan Marr Spalding:

Two shall be born the whole wide world apart,
And speak in different tongues, and have no thought
Each of the other's being, and no heed;
Yet these o'er unknown seas to unknown lands
Shall cross; escaping wreck, defying death,
And all unconsciously shape every act
And bend each wandering step unto this end,
That one day out of darkness they shall meet
And read life's meaning in each other's eyes.

And two shall walk some narrow way of life
So closely side by side that should one turn
Ever so little space to left or right,
They needs must stand acknowledged face to face;
Yet these with groping hands that never clasp,
With wistful eyes that never meet, and lips
Calling in vain on ears that never hear,
Shall wander all their weary days unknown
And die unsatisfied. And this is fate!

Finger Etiquette.

There are a number of things that the most fastidious and well-behaved persons now eat at the dinner table without the aid of either knife, fork or spoon. The following are a few examples:

Olives, to which a fork should never be applied.

Asparagus, whether hot or cold, when served whole as it should be.

Lettuce, which should be dipped in the dressing or a little salt.

Celery, which may properly be placed on the tablecloth beside the plate.

Strawberries, when served with the stems on, as they usually are.

Bread, toast, tarts, small cakes, etc.

Fruits of all kinds, except preserves and melons, which are eaten with a spoon.

Cheese, which is almost invariably eaten with the fingers by the most particular.

Either the leg or small pieces of a bird. Ladies at most of the fashionable lunches pick small pieces of chicken without using knife and fork.

Chipped potatoes are generally eaten with the fingers by epicures. There must be no particle of fat adhering to the chipped potatoes and they must be crisp.—Delineator.

Paderewski's Teacher.

A writer in the Ladies' Home Journal describing the man who taught Paderewski how to play the piano and his methods says: "In the room where the work goes on are two grand pianos, one for Leschetisky and one for the pupil. Sometimes the vorbereiter comes with the pupil and stands meekly by for directions as to instructing; sometimes the pupil comes alone. The pupil bows in salutation and places the piece to be played upon the professor's piano, never failing to slip underneath the sheets an envelope containing 15 florins ($6), which is Leschetizky's fee per lesson. Then the pupil begins playing from memory while the professor follows along with the notes, interrupting constantly to show by practical illustration how this or that passage should be rendered, this or that fault overcome and making his explanations always in vigorous words, either German or French, for he speaks both languages fluently, besides his native Polish and Russian. He speaks no English, however, so that American pupils must acquire a foreign language before they can understand his criticisms, and these, by the way, are often difficult to comprehend, even at the best."

Hall Caine and the Bible.

In an interview Hall Caine is made to say: "I think I know my bible as few literary men know it. There is no book in the world like it and the finest novels ever written fall short in interest of any one of the stories it tells. Whatever strong situations I have in my books are not of my creation, but are taken from the Bible. 'The Deemster' is the story of the prodigal son. 'The Bondman' is the story of Esau and Jacob. 'The Scapegoat' is the story of Eli and his sons, but with Samuel as a little girl. 'The Manxman' is the story of David and Uriah. My new book also comes out of the Bible, from a perfectly startling source."

The Lizard Orchid.

The rare lizard orchid, which has been lost to the British flora for half a century, has just been discovered, says the Birmingham Post, on Wye Downs, near Ashford, Kent, by the professors at the Southeastern Agricultural College, Wye. The discovery of this rare flower is a very important one and steps will be taken to prevent the choice plant being again lost sight of.

A Peculiar Industry.

A peculiar industry is pursued in early fall each year among the pine forests of the continental divide forty miles west of Denver and along the eastern foothills of the Rockies. It is the gathering of the seeds of the Rocky mountains conifers for exportation. Children of 10 and 12 earn enough to clothe themselves for a year. One grandmother last year made $5 a day and a family of Texas cotton pickers made $200 last fall because they could pick with both hands. The seeds are sent to botanical gardens throughout the world and to the forestry department of the German and American governments.

How to Make Lemon Butter.

Take two pounds of granulated sugar, three cups of water, three well beaten eggs, two tablespoonfuls of butter, two tablespoonfuls of starch, juice and rind of two lemons. Beat sugar, eggs, butter and cornstarch until creamy, then add lemon juice and grated rind and the boiling water. Cook until smooth and clear. Then use as a sauce or for tarts or layer cakes.

Smoking By French Women.

Statistics taken in France in relation to the smoking habit show that within the last year the use of the cigarette and the pipe has found an enormous increase among the women. Indulgence in the narcotic is no longer confined to the secrecy of a private room, but it is freely indulged in before the eyes of all men.

Wall Paper Paste.

A paste for wall paper is made by moistening some starch with cold water until of the consistency of cream. Then pour on boiling water and stir until quite smooth. Let it boil once and just before removing it from the fire add a small quantity of powdered glue.

For Lead Marks in a Carpet.

Use a good carpet soap and do not dampen the carpet any more than is absolutely necessary. As soon as the spot is removed sponge the surface with clear water and then rub with clean cloths until perfectly dry.

PIANO BUYERS, ATTENTION!!

Write at once for our special
summer bargains in

**Fischer,
Kohler & Chase
Knabe
Steinway**
and other pianos.

Easy Payments Arranged on Any Instrument

Handsome booklets free on application.

KOHLER & CHASE

Established 1850. Oldest and largest
music house of the west.

30 O'Farrell St. San Francisco

ONE GOOD INTENTION

By H. M. Cushing.

"THAT'S a strange tale you tell and I have a mind to report you to the sheriff, but most likely he's dead drunk at Tom Bradley's! You say you found that diamond under a manzanita bush on Lone Mountain? Well, diamonds of the first water, cut like that, aren't generally picked up on a mountain side.—What's that? Want me to give you the price of your fare to the city for it? Smart, ain't you? Think I was born on the first of April? What do I want with a stolen jewel? Have it found in my possession and then where would I be? Fine tale I'd have to tell a judge and a finer chance of San Quentin. You wouldn't part with it only you have a chance to work in the city if you could only get to it? It seems to me you're powerful anxious to get an ignorant country woman to take it off your hands. How's that? Look into your face and see if you're not a honest man? Well, I have seen worse faces. A woman who has spent most of her life around mining camps gets used to the hard lines in a man's face. That's what makes me suspicious of your honest looks. Well, by Gosh, I've a notion to chance it and see if one good intention will work straight! Here's a couple of fifties; that'll leave you a few dollars for pork and beans until you get that work. And now be off before I repent of a woman's natural born soft-heartedness."

This animated, almost one-sided conversation, took place one sunny morning at the back door of Nora Stringley's cabin and explains itself.

The man walked off with straightened shoulders and that is the last Boomville saw of him.

The woman shut the door, then stood with the glistening, fascinating stone in her hand, and a puzzled, whimsical expression on her face.

"That man must think I'm as gullible as a tenderfoot to believe such an absurd yarn, and yet—he had a look like Sam, and Sam was always as honest as sunshine, that's why he died too soon and left me—still Nora Stringley. Well, if Judge Townsend wouldn't laugh if he knew, and say, 'That's just like a darned woman, to let a lot of sentiment trash put her off her guard.' Judge shan't know it, nor any one else. I'll just wrap it in this old dress and put it in my box." Saying which, she snapped the lock; and as she rose from her stooping position a smile brightened her sunburnt face. "Well, I'm glad I did it; now let's see what comes of it."

For a while it seemed as if nothing was to come of it. Five months went by and the leaves were falling when a young Englishman came to Boomville. He wasn't a miner, and he wasn't a gambler; in fact, Boomville wondered several days what he was and then left him alone as a dreamer. He took a room at the "Hotel," talked quietly, made no friends and spent his time on long walks. But no matter which way he went he always came back the same way—the old stage road down Lone Mountain.

Nora heard of him, of course, and soon got to know him, as the "Hotel" proprietor sent him to her with his laundry. Her keen eyes searched his face, and, behind the mask of calmness, found that look of intense worry which a man can never hide from a woman, no matter how he may blind his fellow man. Then, from her ironing board by the window, she watched him, and found it wasn't the grandeur of the mountains nor the swaying of the pines that took him forth, for he never lifted his eyes from the ground. "That man has something on his mind," she said to herself, "and what's worse, it's something that is hurting his heart." With that she put an extra shine on his shirt bosom.

Nora got into the way of stopping to chat with him when she took his washing back, telling him quaint tales of early days, of the trials and fun of the pioneers. He would listen politely, but as soon as she was gone would be off on the road again.

The days wore on. Winter came, and the rains tore the mountain roads and filled them with roaring streams. Then despair came into the Englishman's face. The miners tapped their foreheads and winked at one another when he passed. But Nora knew better. She grew more kind and had him up to her cabin for hot soup and talked to him as she ironed and he sat by the stove. And he grew to like and trust her and came every day. They talked of mines, of eastern capital and the output of ore—but never of himself. And ever his eyes looked wistfully toward Lone Mountain.

One morning she missed him, and was making some excuse to take her down town, when the "Hotel" boy came up and said the Englishman had mountain fever and they couldn't understand the jargon he talked—would she come down and nurse him?

She went and tended him. In the long hours of the night she heard it all and blamed herself for a short-sighted, blundering fool not to have known it all before. Of course, it was the diamond he had been seeking. There she was doing all in her power to help him and all the time with the remedy in an old box in her room. The tears stood in her eyes as she heard how his dying father had sent the diamond to him from Africa as a setting to a ring for his beloved; how the "Girl" had gloated over it, fondled it and begged him to have it set so that she could twist it on her finger; how he had ridden across the mountains to have a city jeweler set it, had grown weary and dismounted for a rest under the bushes on Lone Mountain, had fallen asleep, awakened and gone on his journey, only to find on his arrival in the city that the jewel had disappeared; of his belief that it had been stolen; of the girl's cruel unbelief of his story, claiming that he had squandered it, and the breaking of their troth; how the idea had flashed into his brain that it had fallen from his wallet as he slept; his coming to Boomville, and the long, fruitless search. Over and over he told it in broken snatches, until she thought the morning would never come, when she could leave him and slip away to her cabin where a cruel, glittering stone seemed to be cutting into her heart.

At last the watch was over. She hurried home, snatched out the old dress, put it under her shawl and went quickly back. She slipped quietly into the room, opened the shutters so that the sunlight streamed upon the bed, and then before his fever-brilliant eyes, held up the stone. Magic in India never worked more quickly than that flash upon the sick man. He caught the stone and kissed it, calling it his recovered treasure, begged Nora to let him write to the "Girl," and she let him. The "Girl" came to him and begged forgiveness for the mistrust, and they were happy.

The people who read the advertisements in the city papers wondered to see for a week in the personals this quaint insertion:

"The man who found a diamond under a manzanita bush and sold it to a country woman may be content. His story is believed. The good intention worked straight."

SEMI-TROPICAL GARDEN IN AUBURN, PLACER COUNTY, CALIFORNIA. Courtesy of Sunset

The Religion of Work.

Recently they had a convention of religion at Chicago. The eminent educators and preachers of the country—really some of the most eminent—gathered to discuss how to teach religion and good living to children. Their essays and addresses were profound, but the one man to put the most common sense into his talk was the president of Oberlin college. He said—well, we will quote the account of the Chicago Journal:

"To allow a child to grow up in idleness and selfishness in the home is a hideous crime. A return to home chores would be a distinct addition to religious education. Parents should see that children have some daily service to render in the home and thus learn unselfish duties."

Chores for the children is common sense. The devil, who we believe is a very active individual, certainly rejoices when he sees a child reared in idleness. "Satan finds some mischief still for idle hands to do." He always will.

One reason why country children live more successful lives than city children is that country children are put to work at an early age. Habits of industry are formed by the child early put at work. Habits of industry are the basis of success in life. Unfortunately, too many farmers overdo this matter and make their children work too hard. But more children—certainly more city children—are injured by too little work than are by too much work. We don't believe much in people working too hard. Most alleged cases of that sort are people working hard to keep from working hard.

A LAD'S HEROISM

THE Windsor Magazine contains an article on "How Public Schools Honor Their Dead." Perhaps the most interesting of all the memorials illustrated is the tablet erected in Glenalmond school to the memory of Alexander Cumine Russell. "For, till time shall be no more, there can be no grander deed, in every sense, done by mortal soldier—let alone by a boy just out of school, a mere lad of 17, who was yet an officer in the 74th Highlanders, now the Highland Light Infantry.

"Everybody knows the story of 'The Loss of the Birkenhead'—how the troopship struck upon a rock; how the soldiers were formed in ranks to die, while the women and children were being saved; how the whole force, officers and men, stood at the salute, while

> 'Still inch by inch the doomed ship sank low,
> Yet under steadfast men.'

"Russell was ordered into one of the boats carrying the women and children for the purpose of commanding it, and he sat with dimmed eyes in the stern, some way off the doomed ship, watching the forms of his beloved comrades and fellows standing upright there. He saw the ship go down, carrying with it the hundreds of brave hearts. He saw those fearful creatures of the deep siezing their prey and heard the screams of scores of human beings torn to pieces by sharks. Then, just when all for him was safe, when to him was given (with honor) life, ambition and glory, he saw a sailor's form rise close to the boat and a hand strive to grasp the side. There was not room in the craft for a single person more without great risk of upsetting the boat.

"But as the sailor's face rose clear at the boat side a woman in the craft called out in agony, 'Save him! Save him! He is my husband!' No room in that boat for one more! But Russell looked at the woman, then at her children, then at the sailor struggling in the waves, with his eyes beseeching help, then at the dreaded sharks feasting on every hand.

"Alexander Cumine Russell rose in the stern of the boat. With a bold plunge he jumped clear of it and helped that sailor into what had been his own place—and safety. Then, amid a chorus of 'God bless you!' from every soul in the boat, the young officer—a lad of 17, mind!—turned round to meet his death. And those in the boat shut their eyes and prayed. When they opened them again Alexander Cumine Russell was nowhere to be seen!"

AN ORCHARD SCENE NEAR MARYSVILLE, CAL.

The monkey lost his hold and fell into the crocodile's waiting jaws. Even then his wits did not desert him. "I just dropped in for dinner," he said, with an engaging smile.—Yale Record.

Orchard and Farm is $1 per year. Subscribe now.

The Radish.

A recent French paper contains a report of an interview with the Abbe Seb. Kneipp of Woerishofen, Bavaria, the celebrated advocate of the "water cure" treatment of diseases, in which he extols the curative properties of the common radish. He says:

Everyone knows the radish and all eat it willingly, but all do not know what value the radish possesses as a remedy for the cure of many diseases.

It acts energetically on the stomach, but it must be used with prudence. As the owner throws a thief out of his house so the radish drives out of the stomach the most annoying flatulence. It is a real cleanser, fulfilling its functions with care, thoroughly sweeping not only the stomach, but the bowels. Now we know how many diseases are the result of flatulence.

The radish is an excellent diuretic, acting in the most favorable manner on the bladder.

It is a good remedy for dropsy in its first stages. It vigorously attacks the disease and quickly eliminates from the body all superfluous substances.

It is an excellent cleanser of the liver.

It is a great mistake to use salt, except in small quantities, with the radish.

For a chronic cough the radish is found to be an excellent remedy. For this the proper method of preparation is to cut the radish in thin slices, which place in a convenient vessel and on it throw white sugar. After standing a short time shake vigorously. The sugar dissolves and there is obtained a white, thick pap, composed of sugar and the juice of the radish, having the peculiar property of a dissolving agent. It will act with great success in cases of chronic cough, it will equally cure all pulmonary affections, if the lungs are not already perforated.

In place of sugar, honey may be used in the preparation of the remedy. The juice of the radish imparts to honey its greatest force. Combined together they act in a very salutary manner on the lungs, the bronchial tubes and the entire respiratory organism. By taking three or four spoonfuls each day mucous obstructions will be removed.

By boiling the radish in a small quantity of water a rich broth will be obtained, which, sweetened with a little honey, constitutes an excellent remedy for all mucous obstructions of the throat or lungs, when taken in a dose of a spoonful each day.

The Rialto Canner.

Makes home canning a luxury. Gives every farmer and fruit grower a cheap and reliable canning factory of any capacity. Simple and efficient. Thousands in use, all giving satisfaction. Write for circular. Rialto Canner Co., Stockton, Cal. *

The first box of cherries sent out of California this year was shipped to Philadelphia and was sold for $25. The first batch of cherries sent out last year brought $25.

COOKING

GERMAN PICKLES.

Select some middle-sized cucumbers, lay them in water for several hours, have a jar or barrel for them, then put salt, pepper, ginger and dill, then several layers of cucumbers and so on until the barrel is full; also put about one-half dozen red peppers between; do not use much salt, as one can always add more if needed after testing; then fill the barrel with cold water and put a rock on to hold them down; will be done to eat in about two weeks.

STUFFED EGGS.

Chop very fine a green pickle, green pepper, onion, radish, celery and lettuce. Have some eggs boiled hard and cut lengthwise, rub the yellow smooth and mix with the chopped greens. Add some shrimps, anchovies or sardines. The shrimps must be chopped just a little bit, and if fish is used instead, bone and skin them and then rub as smooth as possible; add a little salt and pepper. The best olive oil and vinegar should be mixed in, but not enough to make too soft. Fill up the whites in shape of whole yolk. Pour mayonnaise dressing over each egg.

BALTIMORE CARAMELS.

Two and one-half pounds brown sugar, one-half pound chocolate, one cup sweet milk, one tablespoon butter; mix all together and stir constantly over a hot fire until it hardens when dropped in cold water; usually takes between twenty and thirty minutes if fire is hot; pour into a buttered pan and when nearly cool cut into squares. One-half this amount will make sufficient for a few people.

WELSH RAREBIT.

One-half pound fresh Clatsop cream cheese, two tablespoonfuls of butter, one teaspoonful Worcestershire sauce, one-half teaspoonful mustard, one-half tumbler of ale, a little red pepper and, if preferred, a hot dash of tobasco sauce. Put ale, mustard, butter, pepper and Worcestershire sauce in a chafing dish and let come to a boil, then stir in cheese, which has been cut or broken into very small pieces. Stir until melted, when it will be a thick cream. Serve on hot buttered toast or crackers on hot plates. This will make enough for six or eight persons.

CHOW CHOW.

Cut one peck of green tomatoes and six large onions in thin slices, and with one teacupful of salt, pack in layers of tomatoes, onions and salt and let stand over night, in morning pour off liquid that has formed; add four green peppers and chop all very fine; put in porcelain kettle one pint of vinegar, a tablespoon each of cloves, cinnamon, white mustard and celery seed; one cup of sugar, add chopped tomatoes, onions and peppers; cook until soft; then mix one tablespoon tumeric in cold vinegar and add; bottle in fruit jars.

PICKLED ONIONS.

Take small onions, silver skin preferred, put them on stove in a kettle of cold water and let them become well heated, then peel; put them in salt brine strong enough to float a potato; leave them for three days; then take from brine, bottle and cover with malt vinegar that has been boiled with spices, seal.

DEVIL CAKE.

Custard part—One cup of grated chocolate, one-half cup of sweet milk, one cup of brown sugar, yolk of one egg, one teaspoonful of vanilla; stir together in porcelain saucepan; cook slowly until thick and put to cool. Second part—One cup of brown sugar, one-half cup of butter, two cups of flour, one-half cup of sweet milk and two eggs; cream butter, sugar and yolk of eggs; add milk and sifted flour and beaten whites of eggs; beat all together, then stir in.

MINT SAUCE.

One-half cup fine chopped mint, two-thirds cup vinegar, four tablespoons best brown sugar, stir up well.

Hold onions under water while peeling and slicing them and so save yourself many involuntary tears.

Orchard and Farm is $1 per year

SAN FRANCISCO MARKET REPORT

Produce Market.

WHEAT.

California milling, new	$1.37½@1.42½
California No. 1 shipping, alongside	1.35 @
Oregon club	1.32½@1.35

BARLEY.

Feed, No. 1 to choice new	$1.02½@1.05
Feed, fair to good	1.00 @1.02½
Brewing, No. 1 to choice new	1.07½@1.12½

OATS.

White oats, fancy feed	1.27½@1.30
White, good to choice	1.25 @1.27½
White, poor to fair	1.17½@1.22½
Gray, common to choice	1.15 @1.20
Milling	1.20 @1.22½
Surprise, good to choice	1.25 @1.32½
Black Russian	1.10 @1.17½
New red	1.10 @1.20

RYE.

Good to choice	$1.05 @1.10

BUCKWHEAT.

Good to choice	$1.65 @1.80

CORN.

Large white, good to choice	$1.30 @1.35
Large yellow	1.27½@1.32½
Small yellow	1.50 @1.54

BEANS.

Pea, fair to good, 100 lbs	$3.40 @3.50
Small white, good to choice	3.15 @3.25
Large white	3.00 @3.10
Pinks	2.90 @3.00
Bayos, good to choice	3.65 @3.75
Reds	2.90 @3.00
Limas, good to choice	3.50 @3.65
Black eye	2.90 @3.00
Garbanzos, large	2.00 @2.25
Garbanzos, small	1.25 @1.50

HOPS.

Good to choice, Caiifornia 1902 crop	$.17½@ 20

HAY.

Wheat, good to choice	$ 9.50@12.50
Wheat and Oat	9.50@12.00
Tame Oat, good to choice	9.50@11.00
Wild Oat, fair to good	8.00@10.00
Barley	8.00@10.50
Clover	8.00@10.00
Alfalfa	8.00@10.00
Compressed	10.00@12.50
Straw, ⅌ bale	.45@ .60

MILL STUFFS.

Bran, ⅌ ton	$23.50@24.50
Middlings	26.00@28.00
Shorts, Oregon	24.00@25.00
Barley, rolled	22.00@23.00
Cornmeal	27.50@28.50
Cracked corn	28.50@29.50

SEEDS.

Flax	2.00 @2.25
Mustard, yellow	2.75 @3.00
Mustard, Trieste	3.00 @3.25
Canary, ⅌ lb	.05 @ .05½
Rape	.01½@ .02½
Hemp	.03¾@ .04

HONEY.

Extracted, white liquid	$ .05½@ —
Extracted, light amber	.04½@ .05
Extracted, amber	.04 @ .04½
Extracted, dark amber	.03½@ .04
White comb, 1-lb frames	.11 @ .12
Amber, comb	.08 @ .10
Dark comb	.07 @ .07½

BEESWAX.

Good to choice, light ⅌ lb	$ .27½@ .29
Dark	.25 @ .26

LIVESTOCK AND MEATS.

Beef, 1st quality, dressed, net ⅌ lb	$ .06½@ .07
Beef, 2nd quality	.06 @ .06½
Beef, 3rd quality	.05½@ .06
Mutton—ewes, .08@.08½c; wethers	.08 @ .09
Hogs, hard grain, 150 to 250 lbs	.06 @ .06¼
Hogs, large hard, over 250 lbs	.05¾@ .06
Hogs, small fat	.05¾@ .06
Veal, small, ⅌ lb	.09 @ .10
Lamb, spring, ⅌ lb	.10 @ —

BUTTER.

Creamery, extra, ⅌ lb	$.25 @ —
" firsts	.24 @ —
Dairy, select	.24 @ —
" firsts	.23 @ —
Mixed Store	.17½@.19

CHEESE.

California, fancy flat, new	$.12½@ —
California, good to choice	.11½@.12
California, "Young Americas"	.12 @.13

EGGS.

California, select, large, white and fresh	$.21 @ —
California, select, irregular color and size	.17 @.20
California, good to choice store	.16 @.17

POULTRY.

Hens, California, ⅌ dozen	4.50 @ 5.50
Roosters, old	4.50 @ 5.50
" young (full grown)	8.00 @ 10.00
Fryers	4.50 @ 6.00
Broilers, large	3.00 @ 4.00
Broilers, small to medium	2.50 @ 3.00
Ducks, old, ⅌ doz	3.50 @ 4.50
" young, ⅌ doz	4.00 @ 5.00
Geese, ⅌ pair	1.00 @ 1.25
Goslings, ⅌ pair	1 00 @ 1 25
Pigeons, old, ⅌ doz	1.50 @ 1.75
" young, ⅌ doz	1.75 @ —

RAISINS.

Prices at common shipping points, crop of 1902: 2-crown London Layers, 20-lb boxes, $1.10 ⅌ box; 3-crown do, $1.15; 4-crown fancy clusters, do, $2; 5-crown Dehesas, do, $2.50; 6-crown Imperials, do, $3. Loose Muscatels, ⅌ lb, 4-crown, 5¾c; 3-crown, 5½c; 2-crown, 5c.

DRIED FRUITS:

(Evaporated or bleached.)

Apples, 50-lb boxes, rings, pressed, good to choice	$.04½@.04¾
Apples, extra choice to fancy, 50-lb bx.	.05 @.05½
Apricots, Moorpark	.08 @.09½
Apricots, Royal, good to choice, ⅌ lb	.06½@.07
Apricots, Royal, fancy	.07½@.08
Figs, 10-lb box, 1-lb cartons	.65 @.75
Nectarines, ⅌ lb	.03½@ 04
Peaches, unpeeled, fair to good	.03¾@.04¼
Peaches unpeeled, choice	.04½@.04¾
Peaches, unpeeled, fancy	.05 @.06
Peaches, unpeeled, extra fancy	.07 @.07½
Pears, halves, fancy	.08 @.09
Pears, halves, choice	.05½@.06
Pears, halves, fair to good	.04½@.05
Plums, black, pitted	.04½@.05
" red and yellow	.05 @.05½
Prunes, silver, good to fancy	.04 @.06½
" in bags, 4 sizes	.02¼@.02½
small	.01¼@.01⅜

(Common or sun-dried.)

Apples, sliced	.03¼@.03¾
Apples, quartered	.03½@.03¾
Figs, white, in bulk	.05 @.05½
Figs, black, in sks, ⅌ lb	.04½@.05
Plums, unpitted, ⅌ lb	.01½@.02

CITRUS FRUITS.

Oranges, Washington navel, ⅌ bx	$1.00@2.50
" Valencias, ⅌ bx	1.50@3.00
" Mediterranean Sweets	.75@1.25
Lemons, California, select, ⅌ bx	2.75@3.00
" California, good to choice	2.25@2.50
" California, fair to good	1.25@2.25
Grape fruit, ⅌ bx	.75@2.00
Limes, Mexican, ⅌ bx	5.50@6.00

NUTS.

California Almonds, shelled	$.16 @.20
California Almonds, paper shell,	.11 @.12
California Almonds, soft shell	.08 @.10
California Almonds, hard shell	.05 @.05½
Peanuts, California, fair to prime	.04½@.05½
Peanuts, Eastern, hand-picked	.05½@.06½
Walnuts, White, soft shell	.14 @ —

Fresh Vegetables.

SAN FRANCISCO QUOTATIONS.

Asparagus	⅌ box	$1.25 @ 2.50
Beans, string	⅌ lb	.02½@ .05
Cabbage, choice garden	⅌ 100 lb	.75 @ —
Corn, green	⅌ crate	1.00 @ 1.50
Corn, green	⅌ sack	.75 @ 1.50
Cucumbers	⅌ large bx	.75 @ 1.25
Egg plant	pound	.06 @ .08
Garlic	pound	.02 @ .02½
Onions, new yellow Danver	cental	.60 @ .70
Onions, new red	sack	.35 @ .50
Okra, green	pound	.20 @ —
Peas, sweet garden	pound	.03 @ .04
Peas, good to choice	sack	1.25 @ 1.75
Peppers, green Chile	box	,75 @ 1.25
Peppers, Bell	box	.75 @ 1.25
Squash, summer	box	.50 @ .75
Tomatoes	crate	.50 @ .75
Potatoes, Burbank	sack	1.15 @ 1.25
" Garnet Chile		1.10 @ 1.25
" Early Rose	cental	1.00 @ 1.25
" Old Oregon Burbanks		1.35 @ 1.50
" new, in boxes	cental	1.30 @ 1.75

ORCHARD AND FARM
LIVE STOCK
Established 1886

WILLARD P CALKINS, President
THOS. D. CALKINS, Vice President

Published the Fifteenth of Each Month at
320 SANSOME STREET - - SAN FRANCISCO, CALIFORNIA
By ORCHARD AND FARM
(Incorporated.)

Telephone Bush - 764

SUBSCRIPTION RATES

ONE YEAR	$1 00
SIX MONTHS	50c
THREE MONTHS	25c
SINGLE COPIES	10c

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TO CONTRIBUTERS.

The columns of ORCHARD AND FARM are open to discussions on all topics relating to the interests which the paper represents. Contributions are solicited from our readers.

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THE DAIRY AND CREAMERY

Tne Dairy and Beef Cow.

IN view of the growing contention that cows must produce butter fat as well as calves on high priced land, in order to be profitable, we copy from a correspondent of the St. Paul Farmer the following on the subject of milk strains of beef cattle. He says:

"Of all the Shorthorn breeders in Minnesota Blackmer & Nelson of Albert Lea and James Stewart of Montevideo are the only breeders that we know of who are paying special attention to the milking side of their full-blooded Shorthorn herd. Their animals are chiefly of Bates breeding. Their calves are not allowed to suck, the cows are milked and the annual production of each cow is approximately known, and the calves after the first few weeks are reared on skim milk and grain."

Then the writer referred to describes the dual purpose cow as follows:

"She should carry the straight, beefy back and straight, meaty hindquarters, The rear quarters should be set wide apart, to allow room for a capacious udder, which should be large and square, with well placed teats. She should have large milk veins and large milk wells. She should have something more of the open organization than the straight beef type; in other words, she should not be as compactly built as the special purpose beef cow. And there should be an exceptionally long distance from point of hip to first rib and the ribs, especially the last two, should not be set very close, with that feminine, motherly appearance, together. Her head should be spare, so much admired in the dairy breeds. She should have the live, velvety touch peculiar to all stock that are economical feeders and she should weigh not less than thirteen hundred at maturity."

In the above description there seems to be but little to interfere with the laying on of high priced flesh and the milking functions are not seriously hampered. This is the beginning, on the part of Mr. Blackmer, of establishing a dual purpose type in his own herd and the dual purpose advocates will be doing the breeding interests a great service by uniting with him in fixing on a definite standard for both males and females.

California Buying Butter East of the Rockies.

The following from the Elgin (Ill.) Dairy Report will be interesting, especially to those who fear that the remarkable growth of the dairy threatens overproduction on this coast:

As an item of news we mention the fact that California has been buying butter east of the Rockies for storage purposes during the present season in large quantities, much larger than ever before. Although the production of butter has been large on the Pacific Coast the consumptive trade has been sufficient to practically absorb everything made in that territory and parties who are desirous of having goods for their trade later in the season have given large orders for Nebraska and Kansas butter and prices have held up remarkably well, as will be seen by the quotations from various points in last week's figures: San Francisco, 27½@23c; Los Angeles, 27½c; Portland, 22½c and Seattle, 24c.

With all the growth of the dairy industry in California and the great increase in the output of milk they have not been able to supply their local trade with all the butter needed.

A dairy of cows may have the highest pedigree and the most perfect milk development—yea, we will go farther and give them the best stables and pastures, with plenty of food and water of the most appropriate kind for milk production—yet all of these conditions will fail to make the business profitable if the cows do not have the proper person to handle and milk them.

Water for Washing Butter.

Few dairymen give sufficient consideration to the purity of the water they use in washing the buttermilk out of the butter, says a writer in the Jersey Bulletin, and also the water used in washing the dairy implements. Let us consider this matter a moment. Few men have taste so dull that they cannot tell rain water from ordinary spring or well water, nor will they drink pond or creek water unless forced to, because they do not like the taste of it. Now creeks, ponds, springs and ordinary wells are all affected more or less by washing and seepage from the adjacent soil, which is always permeated with rotten wood or decayed vegetable matter. If it is a fact that you can taste these things in different kinds of waters, is it not also a fact that these objectionable substances will in some degree have a bad effect upon the butter into which they are incorporated by washing and working?

The custom is to stop the churn when the butter forms the size of wheat grains. The buttermilk is drawn off and the butter is washed through two or more baths of water. Now where does that water come from that comes in contact with every grain of the butter? Is this not a matter worthy of your immediate attention? You know that at least thirteen per cent of the weight of your butter is water that remains in that butter and if it had a lot of rotten vegetable matter in it when incorporated into the butter, that same bad stuff remains in it, accounting for its going off flavor at times so rapidly as to astonish you. Boiling the water goes a long way toward removing this sediment and kills many objectionable germs. Water with mineral taints should never be used.

Decrease in Oleomargarine.

A telegram from Washington says there has been an enormous decrease in the amount of oleomargarine manufactured in this country as a direct result of the law providing that the packages of this product must be marked plainly, so that the consumers may know exactly what they are buying, and imposing a tax of ten cents a pound on all oleomargarine colored in imitation of butter.

The figures prepared by direction of the commissioner of internal revenue show the sale of oleomargarine for the ten months ending April 30th last amounted to 64,511,181 pounds, as against 99,362,803 pounds in the same months a year before, a decrease of 34,851,622 pounds. The tax was paid on 62,295,440 pounds of the uncolored article and on 2,215,741 pounds of the colored product.

The government officials assert that the only conclusion to be drawn from these figures is that a great many persons will not use the substitutes for butter made from cream when they are in a position to know exactly what is being offered them.

There is probably enough milk wasted by poor milkers to pay them their wages and when a good milker is found he should be encouraged—first, by paying him superior wages, and second, by so planning your work that he will not be too weary to do the job well when milking time comes.

Milk of the proper proportions and temperature is immediately assimilable for animal nutrition, but only to the immediate capacity of the animal. Any milk in excess of this capacity becomes a disturbing agent in the stomach and thus disorder results.

There is a determined effort on the part of dairymen—take them as a whole—to raise the grade of their dairy cows. This can be done by selection and weeding out the poorer ones, by better feeds and often by better shelter. There is need for improvement in all these and we believe it is steadily being made.

Increased Use of Milk in Families.

Within the last ten years there has developed a trade in cereal foods, largely through advertising, that is becoming a very considerable factor in connection with the dairy industry. Practically four-fifths of the families of the country today are using some sort of cereal which is eaten with either milk or cream, increasing the consumption of these two articles to a tremendous extent. This probably prevails more generally in the cities than in the country and will account to some extent for the increased demand for milk for retail trade in all of the cities and especially the larger ones.

An Iowa Decision.

The Iowa courts have just decided a very interesting point in regard to oleo having a slightly yellow color. It has been asserted and believed that butter could be incorporated with oleo, thus giving it a color legally. Some oleo very slightly yellow was seized in Iowa and the sellers prosecuted. The oleo men argued that the little color in the butter did not come in as a result of artificial coloring. The prosecutors contended that it made no difference how it got there, as long as it was present. The judge and the jury took this view of it.

Two Essentials of a Barn.

Two things almost universally lacking or at least inadequately supplied in dairy barns are light and pure air. These are easily obtained and although absolutely essential to the best health of the herd and the economic production of clean milk, they are rarely appreciated. If a barn is already built and has insufficient light, more windows can easily be provided. There should be from three-fourths to one and a half square feet of glass for every linear foot of outside wall in the dairy barn.

Milking Machine Improvement.

An Australian writer in the Field states Mr. Alex. Gillies of Terang has patented an invention of what is claimed to be a perfect milking machine. It, like the Lawrence-Kennedy machine, is worked by vacuum and the improvement he has effected is in arranging that a slight pressure applied to the milk tube draws the milk rapidly away. It is claimed that the cow is milked quite clean. The machine does two at a time and about sixteen in an hour.

Pacific Grove Chautauqua Assembles.

The present will be the twenty-fourth consecutive session at Pacific Grove of this, the oldest of the Chautauquas of the coast. All the features of a Chautauqua assembly are represented. The dates are from July 14th to the 25th inclusive.

Summer courses are offered in biology, zoology, Bible study, physical culture, music, nature study, cookery, art and history. The assembly program will be unusually rich and will be grouped about Senator John P. Dolliver of Iowa and the Hon. Champ Clark, U. S. representative from Missouri. Concerts and entertainments of the highest grade form a leading part of the program, including Germaine, the magician, the Knickerbocker Concert Company, the Colonial Ladies' quartette and hosts of others.

A musical convention will be held during the Chautauqua assembly under the direction of Mr. Barnhart of San Francisco. This will be arranged for the benefit of choir singers and other musicians and will be a great privilege. Mr. Barnhart stands in the forefront of vocalists. A chorus will also be formed. Mr John Ivey, long connected with the assembly, has had a beautiful studio erected on the grounds and will maintain a fine exhibit as well as conduct classes. The Southern Pacific Company allows two-third round trip rates for travel to assembly.

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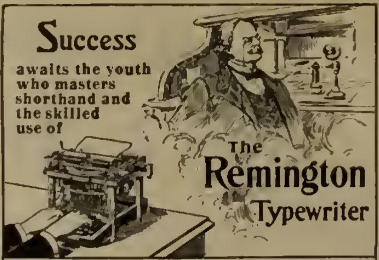
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GOVERNMENT RECLAMATION AND IRRIGATION PROJECTS

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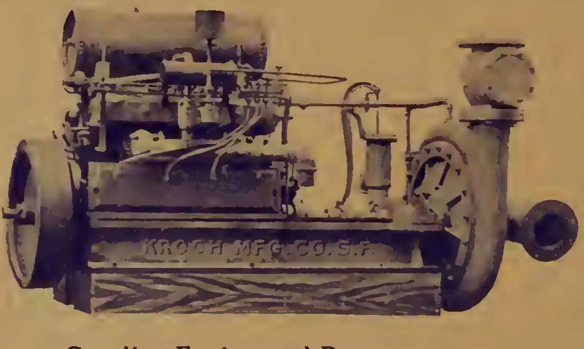

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WE are fully prepared and equipped to design, construct and install pumping machinery to fulfill any requirements in capacities ranging from twenty gallons per minute to one hundred thousand gallons per minute.

All our machinery is made from new and improved patterns built up during the last year.

We have a corps of competent and experienced engineers, who have spent a lifetime in the manufacture of pumping machinery and we will be pleased to assist customers in determining the best type of machinery to install for their pumping conditions.

OUR NEW CATALOGUE No. 0-20 tells all about our different pumps.---Write for it.

Vertical Pit Pump (Automatically Balanced)

IN addition to our full line of Centrifugal pumps we manufacture a complete line of

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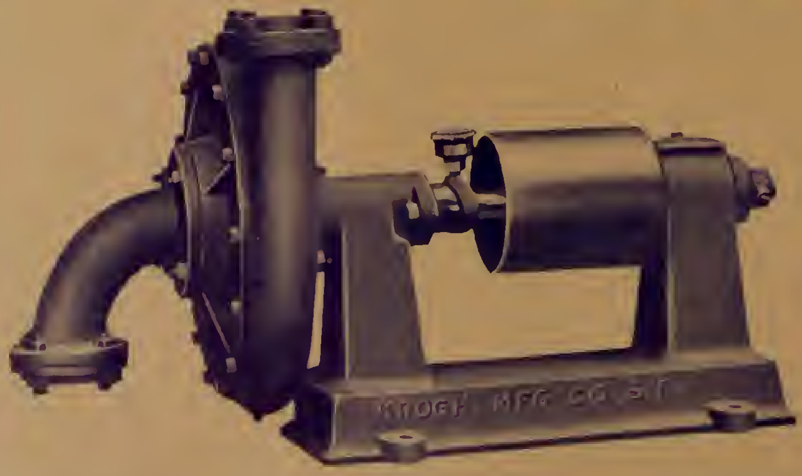
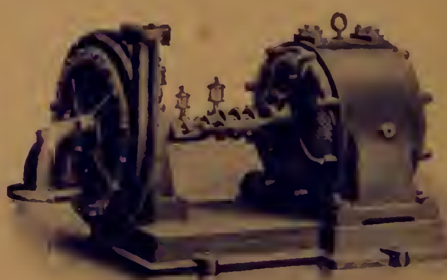


Standard Belted Pumps, greatly improved during this year.



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Irrigation Machinery

1,236 Million Gallons Per Day Requiring 20,450 Horse Power is the Capacity of

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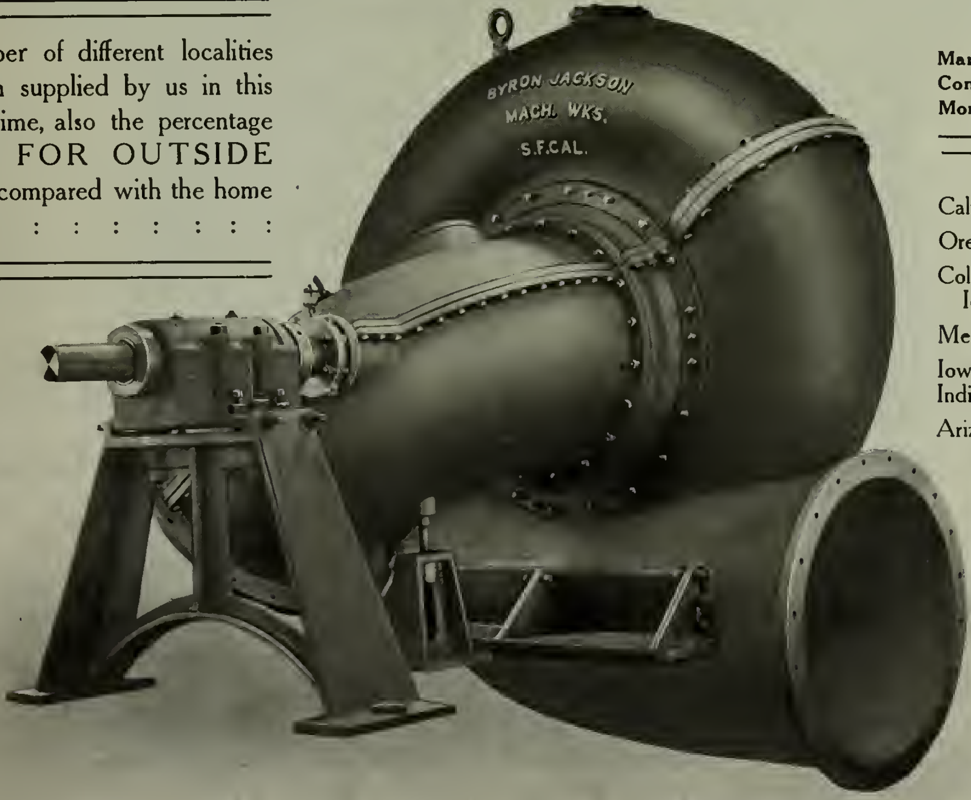

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California - - -	47 per cent.
Oregon & Wash'ton	20 per cent.
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40" Pump, being one of seven now operating in same place.

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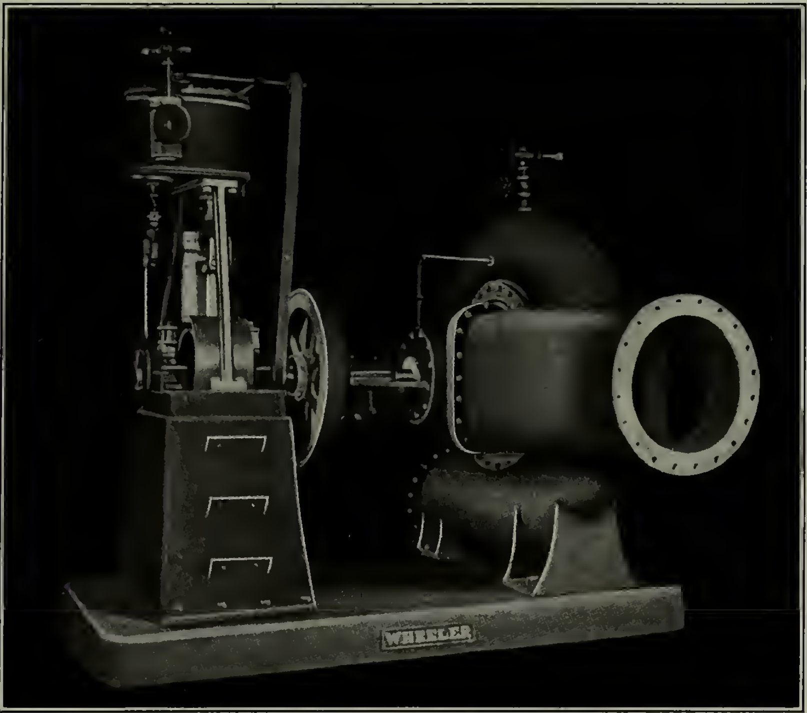

A typical vertical direct-connected engine-driven centrifugal unit built by us.

We are prepared to make plans and estimates or undertake the installation of any class of pumping machinery in all its branches.
Branch offices are maintained in the principal sections of the Pacific Coast, the business of which is handled by experienced engineers, assuring customers, in any location, advice and recommendations along the lines of the latest and best practice.
We invite the most thorough investigation of the work we have done, and that we are capable of doing.
Continued orders from satisfied customers are to our mind the highest endorsement, and these we are able to show.

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GOOD SCHOOLS AND CHURCHES ARE NUMEROUS

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Land grows, equally as well, Spring Wheat, Oats, Barley, Alfalfa, Clover, etc. Unequaled for Sugar Beets. Small fruits and vegetables excel. Dairying is extremely profitable on combination farms.

Irrigable Land ..... $25.00 per acre, $3.12 cash payment.

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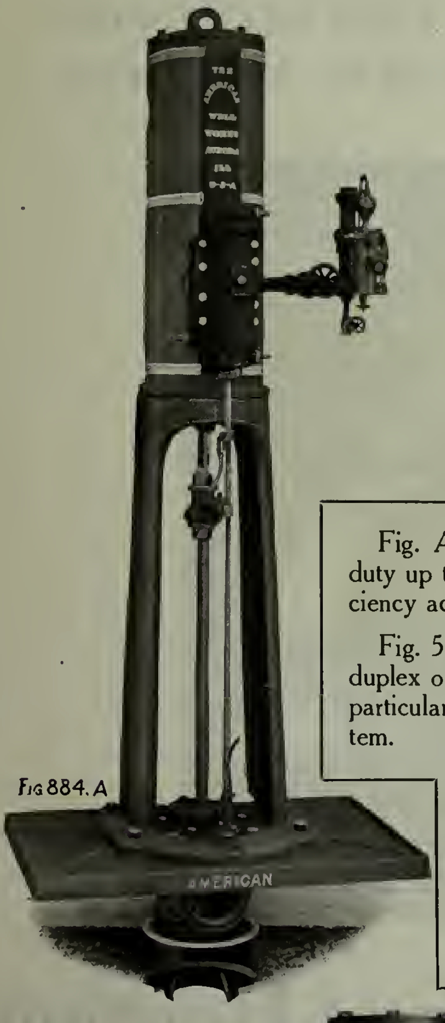

Fig 884. A

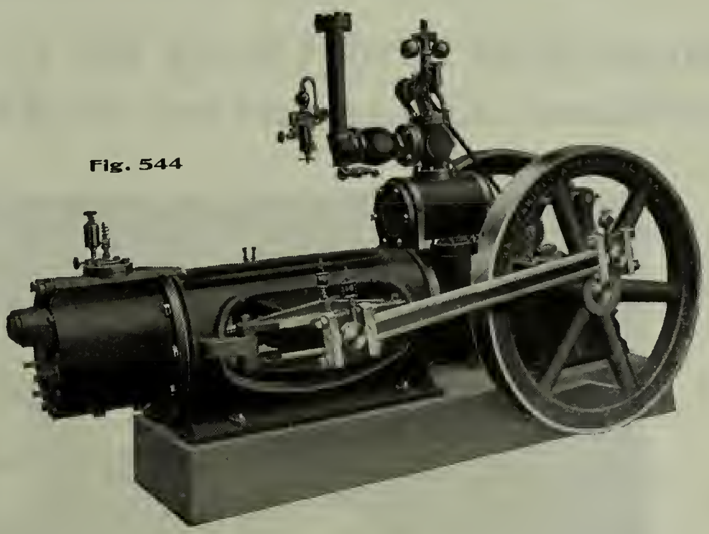

Fig. 544

Fig. A---Centrifugal Pumps for low lifts up to 65 ft., high duty up to 125 ft., 2-stage up to 250 ft. Guaranteed efficiency according to size and work.

Fig. 544---Air compressors, single or double compression, duplex or straight line, steam or belt driven, for all duties, and particularly to operate Chapman Patent Air Water Lift System.

Fig. 222---Steam or gasoline driven mine prospector and well drilling machine for 500 and 1000 ft. work.

Fig. 884 A---Vertical steam or belt power deep well pump, used either with single or double acting all brass water cylinders for all reasonable lifts.

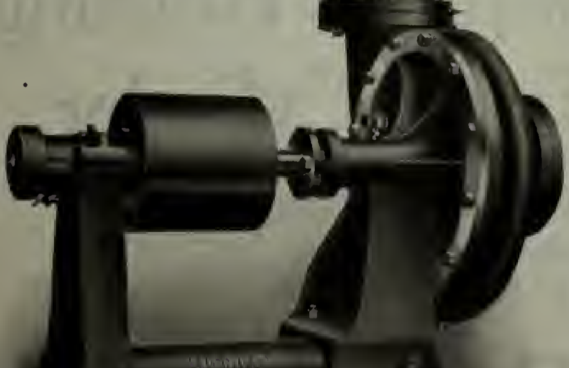

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Fig. A

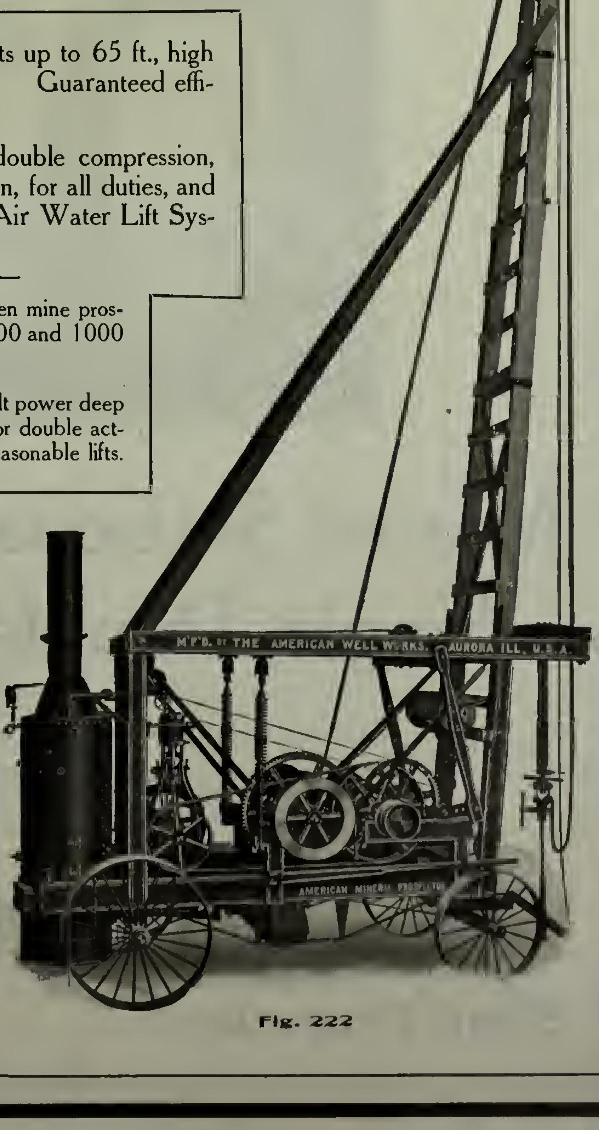
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Fig. 222

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The "Standard"

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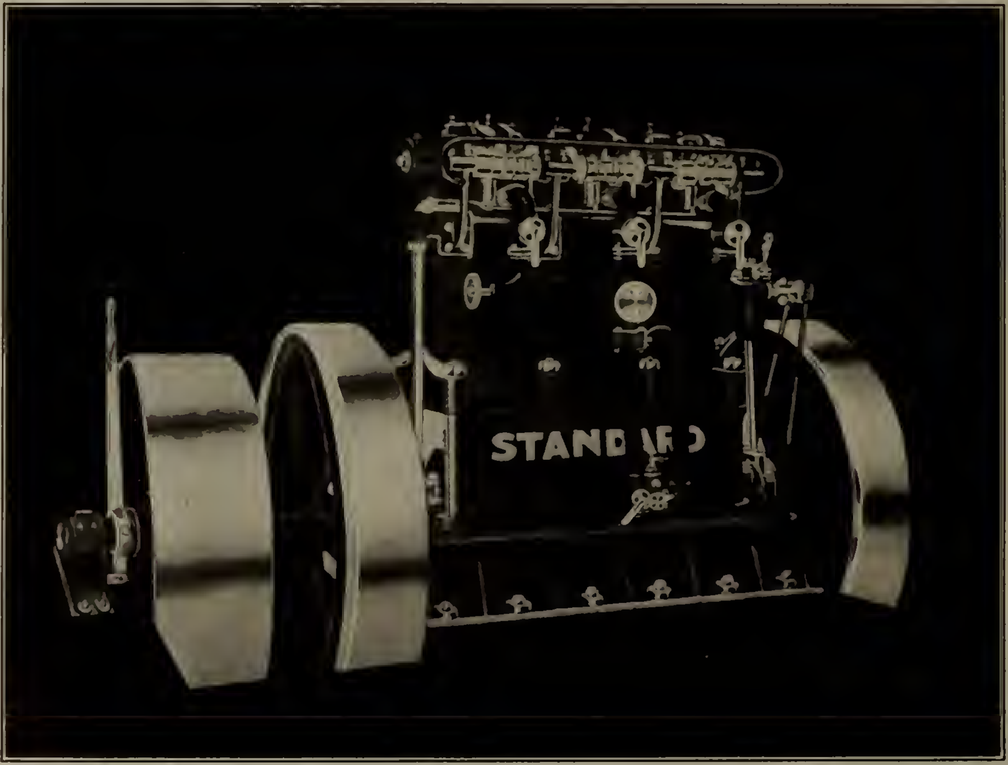

Marine, Stationary, Pumping & Hoisting
Single, Double and Triple Cylinder

Did you ever see one in a repair shop? Ask *any* owner of a "Standard."
Built for service. Operates on minimum fuel.
Don't buy before writing us, stating your full requirements

Standard Gas Engine Co.

San Francisco California Oakland

PUBLISHERS' EXPLANATION

THIS issue of ORCHARD AND FARM presents the only complete description of Federal irrigation projects that has ever been published. ¶ Slight reflection as to the meaning of the foregoing statement will show that the pages following will be invaluable to everybody who takes even the slightest interest in the greatest Government undertaking in the history of the United States. To the many thousands in search of homes the information herein set forth is cyclopedic and invaluable. ¶ In addition to a detailed account of the great projects that will finally embrace an expenditure of $200,000,000 in the irrigation of 6,500,000 acres of land we present valuable data concerning soils, climate, opportunities, the procedure necessary for the homeseeker to institute for the acquirement of land, and germane information on the topics covered. ¶ We also cover another wonderful phase of Uncle Sam's beneficent activity—reclamation. Greater than irrigation—not in the magnitude of works to be constructed, but in the millions of acres of rich lands to be reclaimed—is the drainage of swamps and overflowed lands all over the United States. A conservative estimate places this area at fifty million acres, and a bill is now pending in Congress under which this work will be taken up under the same system and official direction that have brought success to the wonderful irrigation projects now completed and under way. The reader will find herein valuable information concerning drainage as well as irrigation. ¶ ORCHARD AND FARM has gone to great pains and expense to make this number a valuable one. For more than a year Mr. A. T. Taylor and his associates have been visiting the various Federal projects, conferring with engineers, experts, boards of trade, and business men in general. Thanks are due to the enterprising citizens of many communities, to engineers, eminent authors, and others for the cooperation that has resulted in the present exhaustive presentation. ¶ Mr. Paul Richard Edwards, an able writer familiar with this work, aided by an able staff of associates, has had general charge of the edition. The invaluable assistance from the works of F. H. Newell, William E. Smythe, Lucius Wilcox, Gifford Pinchot, Professors F. H. King, E. W. Hilgard, Samuel Fortier, Elwood Mead, and men of like standing is gratefully acknowledged. ¶ It is not too bold a claim to predict that this issue of ORCHARD AND FARM will be filed for reference in a hundred thousand homes and offices, for it is not only a book of facts succinctly arranged, but it is a work of art as well. The hundreds of beautiful halftones tell in photography what the corps of writers has told in clean-cut, interesting, and picturesque descriptions. As a compendium of growing value ORCHARD AND FARM'S great Irrigation Number is destined to rank as the pioneer in the field, a splendid record of what the Government has done and will do for the millions.

THE CALKINS NEWSPAPER SYNDICATE.

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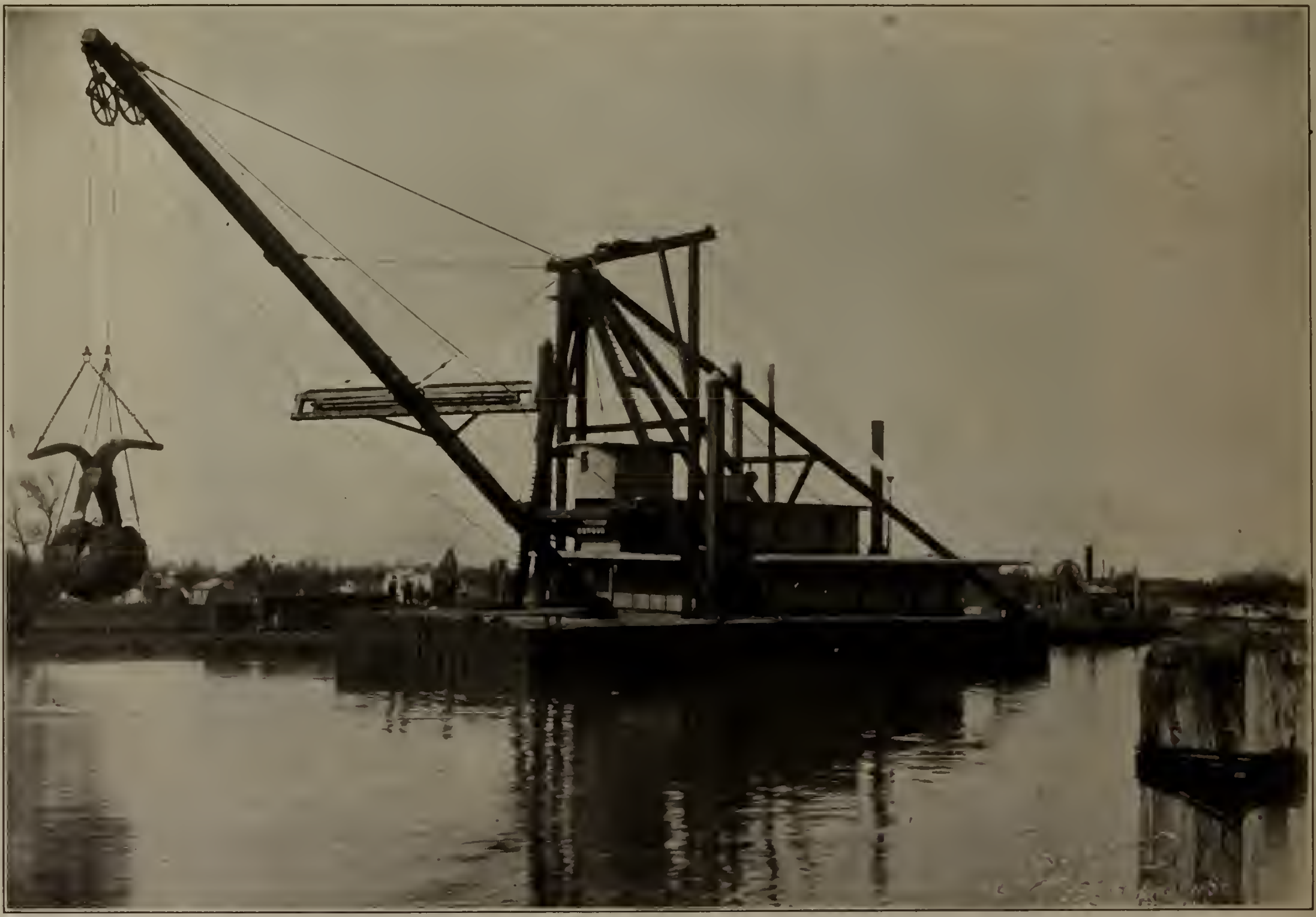

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For Irrigation Districts We Recommend Our Standard One Yard Machine
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Has No Equal for BUILDING DITCHES and KEEPING THEM CLEAN

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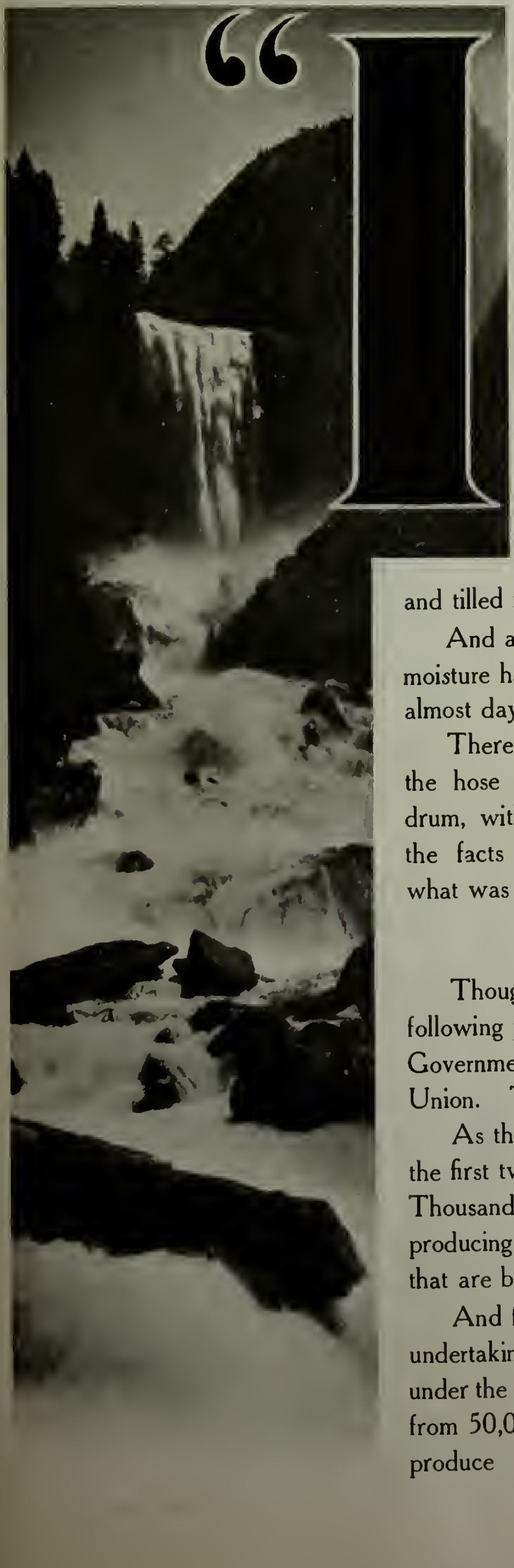
Water Gives Republic New Domain



"IN THE DESERT a fountain is springing." In the waste places where formerly stretched the gray desolation of unbroken dryness, and the sagebrush and cactus monotony that tell the famine tale of drouth, the rose is blooming, and green grasses and opulent gardens grow to the song of murmuring water. It seems, so quick has been the transformation, as if in a night swarms of busy elves had passed over these regions with sprinkling pots and given the soil moisture, scattering charmed seeds on their way.

In other sections, too, less arid than the desert region, but where agriculture has been carried on either by inadequate ditches or by dependence upon the rainfall a similar change has been wrought and in just as marvelously short a time. Farms that had been producing about half what they should, or, at times, when the supply of moisture happened to be shorter than usual, nothing at all, have been brought to yield the fullest crops each year.

Upon these desert wastes and the thinly populated sections where agriculture was at best rather uncertain, pretty farm villages and busy little cities have sprung into existence. Large pieces of land that formerly supported no human life at all, or at best about one family, have been carved up and are giving subsistence and a happy existence to numbers of persons. There is the hum of urban and rural industry where but a short time ago, as the creation of wonderful things may be reckoned, there was desolation, or a sparse setting of farm houses and tilled fields.

And all that has been accomplished in the way of putting nature's bloom on these regions where the moisture has been insufficient is small compared with what is under way and will come into realization almost day by day for years to come.

There have been no elves at work in the night. The United States Government has been turning on the hose of reclamation. It has been doing the work with so little blare of trumpet or beating of drum, with such lack of ostentatation, that people who awaken suddenly to the marvel of it all when the facts are presented to them, are astonished that they should have had such a small realization of what was being done toward building the great Government irrigation systems.

One Project Opened in Two Years.

Though the Reclamation Act was passed in 1902, actual work upon projects was not begun until the following year, but in 1905, only two years later, one of the greatest of all the systems planned by the Government was thrown open, and the water was turned upon a desert sink in the most arid State in the Union. This great event took place with a simple celebration.

As the year 1907 draws to a close water developed by the Government has been turned upon ten of the first twenty-five projects undertaken by it, and next year will see the formal opening of several more. Thousands of acres that were worthless when the Act was approved are already under cultivation and producing wealth for the homesteader and the Nation. Settlers are pouring steadily upon new farms that are being wrested from the waste. New fields are being planted and orchards being set out.

And from the National work of watering parched lands there is about to spring another reclamation undertaking that will produce even greater results in point of area redeemed and richness of soils brought under the spade of the tiller. This is the drainage of the vast swamp region of the East and South, where from 50,000,000 to 70,000,000 acres of fertile land may be rescued from the morass and made to produce crops. This is dealt with in detail in an article in another part of this publication. As far as that can be done by early results, the scheme of the Federal Government to redeem the arid regions and bring to their fullest producing capacity other lands that have not sufficient water has been proved a success. The accomplishment of the Reclamation Service in the short time it has been in existence is aready a marvel of the generation. Before it finishes its work it will be a marvel of the world's current history.

The Reclamation Service has gone forth without any of the noise and clamor of war and begun a conquest of territory as important as that of many a bloody campaign with shot and sword. In their march, the reclamation detachments have struggled in all sorts of climates, from the heat of Arizona, to the cold of the Dakotas. They have braved the dangers of precipice and torrent, and have subjected themselves to varieties of exposure in the search for data needed. They have essayed the biggest mountain dams and the longest tunnel known in such work in all the world. Far from settled communities they are creating reservoirs that would float fleets of the Ocean's biggest steamships. They have performed deeds of daring, unrecorded and soon forgotten. With dynamite and drill they have penetrated towering rock walls. They have dammed with masonry torrents that seem to defy all efforts of man, and thoroughly checked them. They have drained lakes, turned rivers. Foaming defiant streams that had in their flow of centuries cut through every obstacle have been led meekly to the fields. Nations we were wont to turn to for information on the building of irrigating works are coming to us now for knowledge. The achievements of Great Britain and India have been surpassed by the United States Reclamation Service.

Creation of "Farm Unit" Cities.

Behind the splendid work has stood the President, preaching the great sermon of rural life—the health, prosperity and happiness that come from a proper use of the land, and an appreciation of the benefits of the husbandman's existence. His wisdom has shown him that in the closely settled farming community, there will come a greater appreciation of farm life in the West. He knows that the future of the country depends upon a strong, intelligent, educated and prosperous farming class, and that too great a trend toward the cities will not bring the greatest good to the Nation. It is likely that the irrigated sections will be the centers of highly intelligent farming communities. They will create what might be called the "farm-unit city."

Closer social relations, easy communications with cities near by, a chance for the farmer and his family to keep up with the spirit and amusements of the urban settlements, will relieve farm life of the monotony that sometimes tends to make it unsatisfactory. The combination of the urban and suburban will have the effect of producing a citizenship that will embrace the rugged strength and honesty of the farm and the culture and business acumen of the town. The President's hope that the boys may soon be seeking the farm instead of leaving it may be fulfilled.

PRESIDENT THEODORE ROOSEVELT

whose knowledge of the West and enthusiasm for homebuilding inspired him to support the Reclamation Act. His aid of the measure is in the main responsible for its passage.

Makes Its Own Cement and Lumber.

Where larger works are to be installed some of the operations are on a giant scale. The Government has even become a manufacturer itself in some lines in order to carry out some of its projects with the greatest expediency and lowest cost. It has established big sawmills and cement plants, for instance, and on nearly every system undertaken a power plant has been the first thing to be constructed. At the Roosevelt dam, in Arizona, a cement mill was erected at a cost of $218,000 that has turned out nearly 75,000 barrels of cement, worth there about $4.95 a barrel because of the freighting difficulties. Contractors asked $9 a barrel. A lumber mill there has sawed 3,000,000 feet of lumber. All the lumber sawed for the Government is cut on the Federal reserves, so the nation is receiving in this instance a direct benefit from a wise forest policy. There is raw material for cement making near many of the projects. The heavy demand by the Government for this necessary article has caused a great scarcity of it and a consequent big advance in price not figured on when the various works were mapped out.

Many other conditions have made the expense of constructing irrigation systems greater than at the time of preparing specifications, labor and many sorts of material having advanced noticeably.

There is a lull in the matter of beginning construction of new projects or constructing additional units of the ones under way because of these conditions and the increase of prices for material, but it is only temporary, and more of the work mapped out will be taken up as soon as the money from the sale of public lands is considerably augmented by that flowing in from payments for water right installments. Payments from early settlers on two of these projects were due this year. For a time, however, activity will be confined to the completion of the units of the various projects that have been undertaken as the first group under the general scheme.

A few striking features of the work that is being carried on will give an idea of the general magnitude of it all.

The Marvelous Gunnison Tunnel.

The Gunnison River flows in Colorado through a rock-walled gorge 2000 feet deep. Six miles from it, with Vernal Mesa, 5000 feet high, and almost of solid rock itself, intervening, lies the Uncompahgre Valley, with 150,000 acres of rich land needing water and only the small flow of the Uncompahgre River to supply it. To utilize the waters of the noisy Gunnison on this land, the Reclamation Service is boring a tunnel from this river's side under the mesa, a distance of nearly six miles. This tunnel will be the longest of its sort in the world. It will be cement lined and will have a capacity of 13,000 second feet. It will cost $2,000,000. All sorts of dangers have been encountered in driving it and some life has been sacrificed.

To map the canyon of the Gunnison two daring men of the service embarked on a raft far above the inner portal of the tunnel. Their raft was wrecked in the rapids and after several days of hardship they made their way out far below, with the precious data they had gathered in an oilskin bag.

The boring of this tunnel is one of the world's big feats of hydraulic engineering. To carry a river under what is practically a mountain range and turn it upon a valley on the other side is a rare undertaking.

How the town of Roosevelt, above the Tonto, or Roosevelt, dam in Arizona, sits awaiting a death similar to that which overtakes faithless members of the Sultan's harem in the Bosphorus is a story that is pretty well known. When the famous dam that is to store the flow of the Salt River has been finished, this busy little city of 600 will lie many feet under the water of the artificial lake that will be created. Fishes will sail along its streets and turtles will repose in what were once the parlors of its residents. This dam will be among the top-notchers of structures of its class. The lake created by it will be twenty-five miles long and 215 feet deep. On the ocean's edge it would be big enough for a city's harbor.

The wagon road that was cut through the wild mountain defiles, sometimes out of solid rock, to the site of this dam is a wonderful thing itself.

Shoshone Highest Dam in the World.

The highest dam projected by the Government to date, and the highest in the world, is that of the Shoshone project in Northern Wyoming. It will rise 310 feet above bedrock and sit in a narrow gorge of rock. It is only seventy-five miles from Yellowstone Park, to whose natural scenic wonders it will be something of a rival.

The Yuma project is one of the most diversified in features of interest of any under way. There Egypt is reproduced. There was no gorge at Yuma to throw a dam across and thus store the waters. The engineers had to cope with a mighty river that had a proclivity of spreading out over everything from a sort of elevated trough, formed by its own deposits, through which it flowed. The waters were so burdened with silt that to let them run through ditches uncleansed would have meant the choking of those waterways. The engineers planned a great weir dam that will arrest the flow of water, raise it to the height desired and permit an underflow to carry off the settling silt. This weir is upon the type of those constructed in Egypt and India. Great flanking levees had to be constructed from its ends to restrain the floods.

The Yuma system, which is fully described in the special article on that region, is one of the most notable of the sort in the world. The battle that the engineers of the Government and those of the Southern Pacific Railroad had with the Colorado in this region is a familiar one because of the extensive newspaper notice given it while in progress. It has been one of the greatest fights to subdue a turbulent stream that engineers of any clime or any age have known. The forces at work have finally constructed levees that it is thought will keep the water in its proper bounds.

Draining Mountain Lakes at Klamath.

On the border line between California and Oregon two large lakes are to be drained and their areas added to the land that is to be reclaimed under the big project there, known as the Klamath.

Power plants are usually the first things installed on these projects, and with the illumination that can be obtained from them work is carried on at night. The scenes in the mountain fastnesses when work is in progress on the headworks under the electric glare and with the accompanying clamor of machinery and shouts of men are among the most unusual on the American continent at the present time.

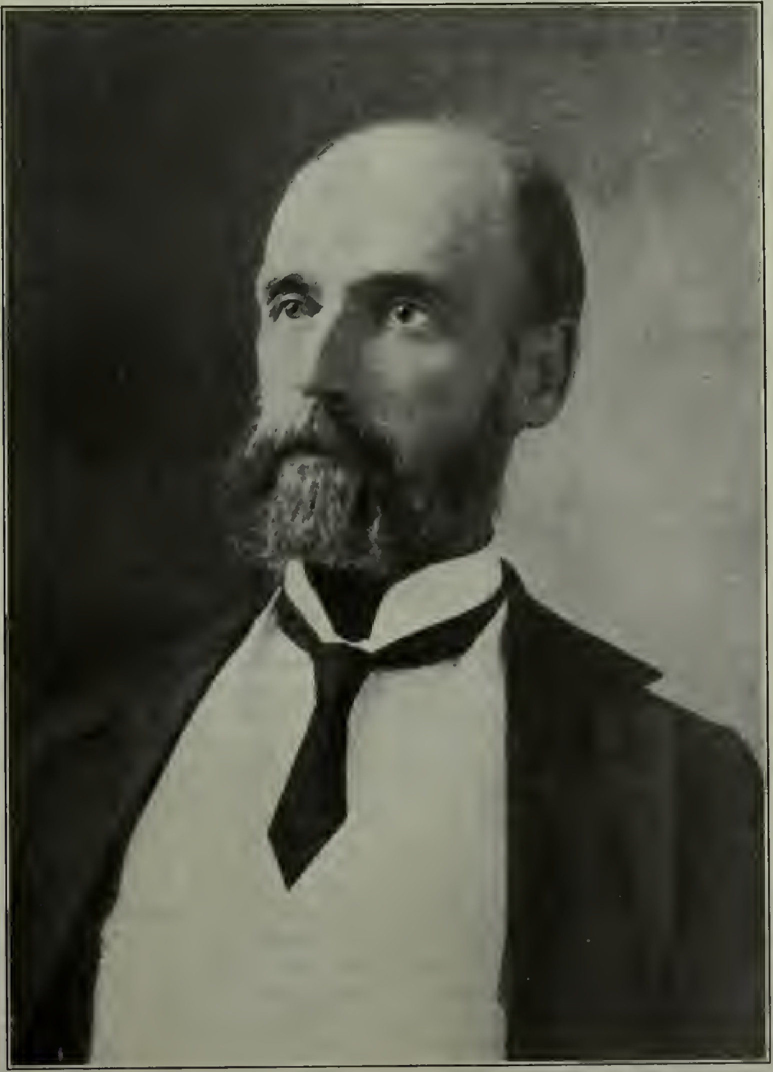
Pumping plays an important part in Government reclamation. The rivers that are controlled are made to furnish electric power for the lifting of their own waters to levels where they can be utilized on fields. On some projects bench lands above the regular canals are irrigated by water forced up to them by the use of power generated at "drops." The service goes after every parcel of land that can be reached and if the gravity canals can not supply it directly pumping is resorted to.

There are some projects, however, that are entirely of a pumping nature. In these, too, are unusual or remarkable features that are not duplicated in the world. On the Garden City, Kansas, pumping project there is a line of pumping stations and conduits with a total length of more than four miles, extending along two sides of a river. There are twenty-three giant pumps that will suck the water from the underground stream that flows through the gravel beds along the unreliable Arkansas. The twenty-three stations are supplied with electric power from a central station about midway of the double line of pumps. There is a total of 230 wells.

Each of these water-sucking monsters will discharge into a concrete-lined surface conduit that will empty into the main canal. The pumping stations will be 1000 feet apart. The underflow of the Arkansas was appropriated at Deerfield for this project.

Floating Pumping Stations on Missouri.

Floating pumping stations operated with power generated from lignite coal that is taken from Government mines on the spot will be a striking feature of the Buford-Trenton, Williston and Nesson systems in North Dakota, grouped under one head as the Williston District Projects. These are all pumping



FREDERICK HAYNES NEWELL, Director of the Reclamation Service.

(Mr. Newell was born in Bradford, Penn., in March 5, 1862. He graduated from the engineering department of the Massachusetts Institute of Technology in 1885 and later took a post-Graduate course in hydraulic work. He first took up duties in Colorado, where he acquired practical knowledge of irrigation engineering. For eighteen years, subsequently, he was acquiring information needed in the reclamation of the arid West and his direct knowledge of every stream source of water supply is said to be remarkable. Under his administration the work of reclamation under the Act of 1902 has been carried on with signal success.)

projects and the water is taken from the Missouri River. The pumps will be rigged on scows with wire connections with the power house. Pumping stations on the shore might be washed away should the erratic Missouri cut around them, or might be left too far from the stream for usefulness should it form a new channel further out. The floating stations will be hauled out of the river each fall and launched again each spring, that they may escape the winter ice jams.

Chas. E. Wells, Supervising Engineer Nebraska, Southern Wyoming and South Dakota.

The stations on the scows will contain only centrifugal pumps, operated by electric motors, and the operation of the pumps will be automatic and so reliable as to necessitate but little attention. The cost of mining the coal will be but $1.25 a ton. The expense of the system will thus be reduced materially.

Each of the twenty-five irrigation projects is described in the subsequent pages of this publication under the heading of the state or territory in which it is located and all the information concerning them and their striking features is given in detail.

Most of the work that has been decided upon and is under way or completed only represents units, or designated portions of the twenty-five projects that are receiving the first attention. Nearly every one of them is to be extended when the money comes in, so that when completed they will irrigate a tremendous area.

Would Make Nation By Themselves.

The Irrigation Epoch is what the present period in the United States, may be named by the historian of the future. The cycle of arid land reclamation through which the country is passing is perhaps one of the most important in its career when the permanency and immensity of the benefit conferred upon the thousands of citizens that will seize upon the opportunities opened are considered. The watering and bringing into blossom of hundreds of thousands of acres of land—later to run into millions—that was capable before of returning little revenue, is as important as the discovery and opening up of a new country. Placed in one tract, all these newly watered regions would make a state richer and more densely populated rurally than any now in the New World's diadem. They would give support to a central city, that, with any general trade advantages, would rank among the first in America, and to many smaller ones. In the aggregate, these lands that the government is bringing from the embrace of the dust cloud and the native brush to that of the emerald alfalfa and the fruit freighted orchard are sufficient in the population they will sustain, in the industries they will nurture, in the cities and towns they will build, in the wealth they will create, in the armies of strong fighting men they could muster, to make a small nation by themselves.

The importance of the work is hardly realized yet by the majority of the people that do not live in proximity to any of the projects, and therefore the majority of the whole population. Gradually, though, as new cities, built up by these reclaimed districts, come into prominence and the regions surrounding them are heard of more in the daily reading of the news of the country, it will be forced upon the minds of the people everywhere that great development has been going on, and the Reclamation Service will come in for the full glory that its achievements merit.

The Whole Story for Settlers.

Though it may be true the country, as a whole, is not fully awake to the empire building that the Department of the Interior, under which the Reclamation Service, though virtually an independent branch, has its being, is carrying on, there are thousands of citizens in many parts of the Union that are watching the progress of this great work with the keenest interest. These are the persons who have ambitions and hopes resting upon this reclamation of lands. They are farmers in regions where crops are not certain, or where the land has been impoverished; men of the cities, toiling at desks, in factories and machine shops who are dwelling longingly on the prospect of a life in the open air, among the birds and the flowers; tradesmen and professional men who wish to better their condition by establishing themselves in towns springing into bustling existence through this potent agency—the wedding of land and water, of which union all industry and all wealth are the offspring. These people are alive to the new chances that the country is presenting and they favor that opened by irrigation. It is they that will build up the areas that the rivers are being led upon. Pioneers among them have already begun acquiring lands.

Complete information upon this subject of reclamation has been eagerly sought by these thousands that rest their hopes on the new farming regions. Some have acquired pretty full knowledge—the majority have but a vague understanding of it all. For the first time since the great work commenced there is presented in complete compiled form the full story of the undertaking—the entire facts needed by those who wish to settle under the systems, together with a description of the projects. Orchard and Farm has prepared this publication for the benefit of all who take an interest in the subject of reclamation, either as intending farmers or as residents of the towns that will spring up, or that, already existing, are growing into cities.

The knowledge most desired is regarding the location of the various projects, number of acres to be watered, character of the soils, crops best adapted to them, and the average profits to be obtained; how to acquire the land from the government or the private owners, the probable price and the requirements in the matter of perfecting title. All this information is supplied in this publication. It is all inside one cover, embracing descriptions of all the projects, and for that reason forms the most valuable work on the irrigation efforts of the government that has ever been issued. The information given is concise, but sufficient for everyone who hopes to take advantage of the chance for getting ahead in the world that arid land reclamation offers.

Government only Lending the Money.

The government is not donating anything to the people in carrying out this work, as some have supposed. It is not presenting them with irrigation canals. The United States simply lends enough money without interest to the settlers under the various projects to put in dams for the creation of reservoirs and to dig canals and ditches. All this money is paid back in a specified time in annual installments by the people taking the lands. It is used again on other projects, so after the first few systems have been paid for, there will be a continual fund for the perfecting of irrigation projects, money coming in from established ones as it goes into new ones. Millions of dollars are being handled and will be handled in the carrying on of the work, but in the end it will all be in the government treasury again, and the people will have land worth several times the enormous expenditure.

The cost of the land depends upon whether it is owned by the government at the time of location—in which case it is nothing—or by private parties, and the cost of the water per acre is dependent upon that of the system. The government is building for permanency, using concrete and other durable and consequently comparatively expensive materials, where possible. The cost of making surveys and soil tests, building dams for the reservoirs, constructing gates and spillways, erecting levees, digging the canals and laterals and doing whatever else is necessary to perfect a system, goes into the total bill and the persons who take the land must pay it in full. Each acre is assessed at its pro rata. The difficulties of putting in the system and the area of land it will water are the two factors that determine the cost

Louis C. Hill, Supervising Engineer Salt River and Yuma Projects.

of the water right. The prices of these rights have been settled upon for most of the projects. They run from $22 to $60 an acre. There are two projects where $60 will be the cost of the water, one $50 and one $45. The average is between $30 and $35.

Government Stamp on Land.

No matter what the assessment may be, the person acquiring the land has the assurance of the government experts that its producing powers make it worth the money. All the farm units will not be highly fertile, perhaps, but there will be no government irrigating system under which the soil will not produce sufficient to justify its settlement and insure greater or less profit, to the settler. The government stamp is on every tract, but on some conditions will be far less easy than on others. Some are under semi-tropical climate, some under an extremely rigorous one, thus suiting all classes of farmers. There is not one that doesn't offer excellent opportunity.

Thorough examination is made by the Service of the soil, climate and general feasibility for watering before any project is approved. It must be borne in mind that all lands under a practicable system are not equally easy to carry the water upon. Topographical features make one farm unit perfect in this respect and another difficult of levelling and watering. The advisability of careful and early selection upon the opening of a project, or as soon before as practicable, becomes apparent.

Not only the farming areas, but the cities that lie within them have been considered in this work of reclamation. Every effort is made to give these cities a good start in the world. Electric power is supplied them and also water for fire, street, park, and domestic use. Every one of the growing municipalities under these Federal systems may have its own public utilities. The water and power are supplied at minimum rates. As a stimulus to manufacturing, surplus power is leased to private enterprises. None may obtain a vested right in it, though the leases may be renewed indefinitely. This revenue all goes into the reclamation fund and is credited to the projects under which it arises.

Congress, under the law, receives a report each year of all that has been done under the various projects and of new investigations. These reports are prepared by the engineers in charge of the work at the different locations of projects. All matters of expenditure are noted, so a close track of the fund is kept.

People Giving Their Moral Aid.

The people in general are heartily supporting the reclamation and forestry efforts now. At the beginning there was some opposition by those that did not realize the full benefits to be obtained, but a change of sentiment has come. The results already obtained have had much to do with this. The main opposition at present is being shown, it is said, by promoters who had filed on water rights and hoped to sell them for large sums to Eastern capitalists, not caring how many years valuable lands might go without irrigation, as long as they stood a chance of making some money out of their filings. When the work of reclamation was begun, there was a complaint that it would interfere with private interests, but it has been found to be generally beneficial to bona fide ones.

The complaints made at the last session of the Irrigation Congress, though, of mismanagement and a lack of regard for private rights had something of a serious aspect. They came from only two or three projects. The Congress did not see enough in them to warrant any deep consideration. They will probably be investigated by the government, however, and corrections and restitution made, if they are found to be based on fact. The greatest complaint came from Yuma, though it was made by only a handful of the landowners under the project there. The men of Owens Valley also declared that injustice had been practiced there.

GIFFORD PINCHOT
Chief of Forest Service, who is Working Earnestly to Preserve the Timber for the People.

The future prosperity of districts to be irrigated where there is now little to support human life is shown by the rush of railroads to reach such sections under projects that have no transportation now. Wise railroad men do not lay track into regions where the future does not promise them profitable business. There is no hesitancy about building into any section where the government has decided on irrigation. New lines are being built even into most of these that already have good transportation facilities.

Speculator Regarded As a Foe.

THE Reclamation Service has gone about its work with a special care not to enrich speculators, corporations or large owners of lands under its projected irrigation systems. For this reason the amount of land that an individual can acquire—and only individuals can acquire any—under the several projects is limited to an area calculated to be sufficient for the maintenance of an average family. It varies, but the largest is one hundred and sixty acres and this only in the case of original private ownership. The Act fixed the farm unit at from forty to one hundred and sixty acres, but this detail was subsequently placed in the hands of the Secretary of the Interior and ten acres is now the minimum. Water will not be granted for any tract of land in private ownership that exceeds the limit stated. The settler must actually live upon his land and improve it and he cannot get his patent until all the installments for the water rights are paid and at least one-half the tract held by him is under water and cultivated.

All the public lands are divided into farm units. The average is from forty to eighty acres, according to the character of the soil, the difficulty of bringing water upon it, and the distance from townsites, smaller units being laid off nearer the towns. Each unit will contain as near as possible, though, the same average amount of irrigated land.

The Fourth section of the Act provides that the Secretary of the Interior shall give public notice of the lands that may be had under each project and the limit entry, the charge per acre for water rights and the number of annual installments, which shall not exceed ten. An effort will be made to have Congress extend the period in which water rights may be paid for.

The withdrawal of public lands under the provisions of the Reclamation Act is to withhold them from entry during the making of surveys and investigations by the government as to the feasibility of putting water upon them. The withdrawal of a certain section does not mean that irrigation is to follow, even though surveys may be prosecuted. Those surveys determine the amount of water available, what lands can be watered and whether the cost is too great to justify the undertaking. Experts at the same time look into the character of the soil. With the result of all this investigation on hand, a determination as to whether the project shall be carried out is reached. Even if it is feasible, only a portion of the lands withdrawn is likely to be irrigated. Usually unappropriated water is also withdrawn from filing.

Must Watch for the Notice.

It is impossible for the service to give any information concerning any particular tract until the public notice already mentioned is promulgated by the Secretary of the Interior.

Homestead entries may be made for the lands withdrawn as irrigable under this Act, in accordance with the general laws. The commutation provisions of the homestead laws do not apply to irrigated units. A failure to make any two of the annual payments when due shall render the entry subject to cancellation, with forfeiture of all rights for the future under the act and of all moneys already paid.

Though in most cases it is impossible to make a living off the Government land without water and in others very hard to do so, the person that files must reside on his tract, once he has located, until the water reaches it. Bona fide residence must be established within six months from the time of filing. It would be thought that this would prevent a rush on some of the desert tracts until near the time when the water was to be turned on. The speculative locator files upon even these areas, though, long before the works are completed and locates under the general homestead law. His hope is to sell his relinquishment to a bona fide settler at a handsome profit. On the Minidoka project, in Idaho, settlement began two years before the water was ready. There were genuine settlers among the earliest ones on this tract and it was hard for them to hold on. Some derived no revenue from the land for more than two years.

The government has determined upon a policy of great strictness in the matter of units filed upon. Announcement has been sent out from the Department of the Interior that failure to comply in strict good faith with the provisions of the law concerning residence will render the entry subject to cancellation. The land preemption laws have ever been the subject of frauds and no doubt there will be many devices hatched by those who wish to shirk actual residence to acquire these lands. How strict the surveillance will be and how successful are questions that time will answer.

Co-operation from Settlers.

It is likely that the government will receive much co-operation in the various irrigated communities as the interests of the latter demand that the lands come into the ownership of actual settlers only. The man that really wishes to acquire title to a piece of land for farming purposes will find it to his interest to put in all his time on it, for otherwise it will not become very valuable to him. These and other facts will tend to stifle fraud or shirking of the Act requirements.

Even private owners of land will not be entitled to water unless they are actual residents upon the one hundred and sixty acres that they are permitted by the Act to retain or live within a prescribed distance of their holdings. Non-resident owners are barred from the benefits of the Act.

Details concerning the acquiring of lands under the Act of 1902 and regarding other matters in relation to them are left greatly to executive discretion, the Act being general in its nature, as will be seen by its perusal. It is published further on. Many important questions will not be settled until cases involving them are brought to the attention of the department. The Act gives the Secretary of the Interior authority to make rules and regulations, but he has been cautious about dealing with contingencies yet to arise, fearing that the progress of the work might be impeded. The policy is to pass on only such matters as current business demands. A series of questions asked the Reclamation Service by intending homesteaders and answers to them have been published for distribution. It is announced that many of the answers given are not necessarily final and that some of them may be reversed or modified in future.

The much asked question as to whether a man may take up a piece of land and perfect his title to it while earning a living in a nearby city is answered in the negative. It is believed by many that sleeping in a house on the piece of land filed on and doing work on the latter morning and night would answer all the requirements of the homestead law under any circumstances, but the Reclamation officials seem to think differently. If these lands are to be cultivated within the meaning of the law, though, the settler will have little time for town life, unless he can afford to hire his labor. It is a fact, however, that many settlers on projects work for the contractors. This is encouraged.

Ordinary "Claim Shanty" not favored.

By the end of six months after filing, the homesteader must have established his residence and commenced actual living upon the land. Even the "ordinary claim shanty" with one door and one window that is more to get inside the law than to constitute a real place of abode, will not be permitted on irrigated land, it is declared, though such shanties have been used. "An actual home where you sleep and take your meals habitually," is what the Department says must be erected. The United States wants its families on the watered land that it expects so much of to put on a good front, have a house that looks like it were really intended for the family and not for the watch dog and give general evidence that they have come to stay awhile and help make a prosperous and happy community. Pianos and Axminster rugs are not insisted on in the furnishing, but it is presumed that natural advance will bring these in time. There are already some fine houses on new tracts. The dominant strain that runs through this epic of home-making by the government is that homes shall be provided for the most citizens possible and that thrift shall bring the patent.

Some of the engineers are working in lovely country. The highest needle point on west face of Superstition Mountains, Arizona.

Secretary Garfield Opening First Envelope at the Drawing for Land in Huntley Irrigation Project at Billings, June 26, 1907.

Title to any portion of a tract of land filed upon cannot be conveyed until the settler has lived the allotted time on it, made the necessary improvements and actually received his final certificate. He may give up a portion of his land before title is perfected for someone else to make an entry on, but he cannot transfer any rights or privileges and the person who preempts the land relinquished must fulfill every requirement of residence and improvement.

Lack of water will be no excuse for failure of residence or work prior to the time of the completion of an irrigation system. The government acts on the presumption that those who locate ahead of time do so for purposes of speculation and that they should assume all inconvenience or relinquish their rights. The Interior Department says further that there can be no assurance of any piece of land being irrigated until public notice is given that it will be. A great many early settlers have made very good guesses, though, and have taken up land early under government projects with very profitable results. There is some land that the topography of the country around irrigation projects makes certain of water and settlers have been able to see a good deal of this land without surveying instruments. "If you enter in advance of the public notice," the department says, "you make a speculative entry, wholly at your own risk, and without any guarantee or safeguard that water will be supplied, and with a reasonable probability that you may lose your homestead right."

The Water Users' Association.

The Waters Users' Association may be termed the keystone of the Reclamation Service land system. In every irrigated area there is one of these associations, formed originally of the owners of private lands. They are formed under government regulation and authority and are really organizations under which the settlers govern themselves. Every person who acquires a piece of land becomes a member of the association in the area covered by the project under which he locates. They all become the common guardians, and the association the particular guardian of the community that takes the water from the government or previously private ditches.

The successful forming of these associations is necessary before the government can begin the work of Reclamation in any particular district, where there is an important body of private land, for the Service will not install an irrigation system until it knows that the private lands upon which water may be carried will be thrown open in tracts of the requisite size to settlers. "They are formed," is the statement of the government officials, "to assure the government that the landowners will apply for water from the irrigation works, and that they will so adjust the existing claims to the use of water that the administration of all the water available for the lands under the project, whether supplied from private or from government irrigation works, shall be under one control—that of the water users themselves."

A synopsis of the rules and by-laws of the Yuma County Association which are looked upon as a good standard for all of them appears in the article on the Yuma project.

A general form for the organizing of these associations has been prepared and its principles have been approved by the Secretary of the Interior. The form of organizations may vary in different localities, however. This is what is required of owners of private lands joining the associations:

They agree to turn over to the management of the Association all water they have previously appropriated, to be administered in connection with the additional water supply furnished from the government irrigation system; to make their former water rights as well as the government water rights appurtenant to the land irrigated; to pay the charges for water rights required by the Reclamation Act; that their land shall be security for the government charge for water, and that such charges shall be a lien on the land which the association may enforce if they do not pay for the water; to dispose of land they may own in excess of land in private ownership permitted to apply for water from the government system.

Are Responsible to Government.

The government of course, retains power over public lands until the total amount due for water rights is paid. The Associations, as seen by what has preceded, make themselves responsible to the government for the repayment to it of the cost of constructing the various systems, but they have a lien on the lands of the members, under which collections can be enforced. In some respects they resemble lodges, from which members may be expelled for nonpayment of dues, with the addition that the associations have a method of enforcing the collection of the dues. The lien on the lands of delinquent members will save others in the association from the hardship of assessing themselves to make good the deficiency of the former.

The title to and the management and operation of the reservoirs and the works necessary for their protection will remain in the government until Congress shall make some other provision. These reservoirs and contiguous works, from which the canals take the water to the lands are the keys to the various systems and until experiment shall have determined all questions that may arise and time shall show whether the methods adopted for the distribution and acquiring of ownership of the water are entirely satisfactory, the government will keep its hands on the throttle by controlling the base of water supply. When payments for the majority of the lands under any system shall have been made, though, the management and operation of the works beyond the reservoir shall pass to the owners of the lands, who shall bear the expense of maintenance. This expense is a permanent one, and what figure it will reach under the various systems can only be determined when they are in operation. It will be reduced to a minimum under the careful supervision of the interested parties, the water users themselves. It has been figured as low as 40 cents an acre per annum under one project.

Some co-operative plan for supplying such labor as may be needed on the canals and ditches may be arranged. For any owner of land to work on the canals for hire would seem to be in opposition to the announcement of the Interior Department that the making of a living at other work while perfecting title to a piece of land would be ground for forfeiture. This is modified in cases where there is no evident desire to shirk responsibilities in the improvement of land filed on.

When the irrigation works are finally placed in control of the water users, there may be some changes in the form of the associations, but it is thought that the present plan under which they are organized will not be deviated from to any great extent.

Existing Rights are Protected.

Each water user will receive a proportional part of the entire supply, not in excess of the amount needed for the irrigation of his land. That there may be no shortage, each association is required to limit its number of shares to the area which the government engineers have decided can be successfully cultivated.

J. H. Quinton, Supervising Engineer for Colorado, Utah and Nevada.

Water rights existing at the time the government takes control of any project are expressly protected by the Reclamation Act. The owner of former vested rights puts them in charge of the association he joins and the water is to be delivered to him as before, being included in the complete supply furnished from the government works. His priority of water right remains intact. It is protected through the association and he may reassert it if ever there should be a shortage. Such vested rights, to receive permanent protection, must be definitely established and made a matter of record.

Owners of tracts of land larger than the homestead allotment are permitted as a reward for entering the irrigation scheme, to reap the profit that the coming of the water brings them. While they will be forced to sell all but the acreage they may legally retain under the Act, they will not have to relinquish it at the price obtainable for it before the system was devised. To encourage such owners of larger tracts to join the associations and put their land in the common pool, the allurement of an enhanced market for their holdings, produced by the great expenditures assured by the government and the certainty of a sufficient water supply, has been held out. A trust deed must be given to the association in all such cases, so that it may ultimately subdivide the land and sell it in compliance with the terms of the act. The agreement stipulated is that if the owner has not sold his land to properly qualified persons by the time the government water supply is ready, the association shall have power to sell it.

Lands not to be Sacrificed.

An objection was made that the associations might sell such lands at a sacrifice, but this was met by the statement that most of the members of such associations having excess lands themselves, they would find any depreciation of values against their interests. It was also pointed out that the time for making the sale is fixed by the Secretary of the Interior, who, it is promised, will give due consideration to all concerned. The opinion was advanced at the outset by the officials that the demands for the lands would be so great as the time for the completion of the works approached that satisfactory prices could easily be realized by the owners themselves and that there would be little, if any, land for the associations to sell. The fact that owners of excess

Secretary Garfield (in middle at front), Director Newell (on Garfield's left), Chief Engineer Davis (on right), and Board of Supervising Engineers in session at Fallon, Nev., on July 31, 1907.

lands might dominate associations and place exorbitant figures on their holdings, thus either forcing settlers to pay too much or continuing to hold the entire tracts for an undue time seems not to have been mentioned. As the strong arm of the government is over it all though, it is presumable that no gouging will be permitted and that prices in keeping with the normal advance will obtain. Besides, there would be no profit in owners of excess lands holding them, unless it were for a long enough time to obtain a still greater raise when the higher state of cultivation had actually been brought about, for, without water on the excess, it would produce no revenue commensurate with the interest being lost on the money obtainable for it under the irrigation value.

The sanguine opinion is expressed by the Department of the Interior that railroads owning large tracts under the new irrigation systems will be glad to put them on the market as soon as it is decided that they are within the zones of irrigation, the policy of the railroads being confidently believed to be identical with the government's as to the making of as many homes as possible. The growth of population causes a like growth in traffic.

In case a mortgage is taken on a piece of land sold by someone that is compelled to subdivide a tract and is foreclosed before the expiration of the period of occupancy necessary for the obtaining of a water right, this right does not go with it under foreclosure. The party foreclosing can obtain the water right only by living on the land, provided he has not used his privilege of filing already.

Land in Private Ownership.

A question as to whether a water right partly acquired is forfeited in case the settler sells his land or dies, is answered as follows: Forfeiture does not necessarily follow, but the land must come into the hands of a person who will live upon it and who is otherwise qualified and does not already own rights to water from other lands.

Land in private ownership is defined to be all land not public at the time of withdrawal under the Reclamation Act—a desert land entry—no such entry can be made after the government begins investigation of a project and makes withdrawal—may be classed as land in private ownership and a homestead entry not made under the Reclamation Act will probably be classed similarly. A desert land entryman or his assignee may apply for a government water right. The time for making final proof on desert land entries will probably be extended in keeping with the ruling that a water right may be applied for under such entry. Ordinarily three hundred and twenty acres may be taken up under the desert land law.

The questions that have been answered by the Department of the Interior up to date concerning these lands are not all that will have to be answered. There will be many contentions to be straightened out, many disputes to be settled, but there can be few if any that will in any way involve the bona fide settler who acquires his farm unit either by homesteading or by purchase from an 'excess' owner and settles down to honestly 'do' his time and establish a permanent home. It is not likely, either, that the ruling as to staying by his farm will be so severe as to prevent him making such trips to a distance as will be necessary in the course of business affairs or in ordinary pursuits of pleasure. It is hardly reasonable to suspect that the government is going to stand over these inhabitants of the irrigated sections with a school ruler and whack the knuckles of each one that drops his spade, notwithstanding the avowed intention to make a very close residence necessary to perfect title to water.

Chance to Acquire a Farm.

The clerk in the store, the bookkeeper who has bent over his figures until he feels that any life of physical activity would soon tie him in a knot, the professional man, many men in fact that have led lives that do not give a conciousness of muscular capability, may fear that they will not be able to perform under the full strength of the sun, the heavy toil that is called for in the work of reclaiming sage-brush or cactus wastes. It certainly isn't like playing golf or billiards, but the city store or office worker need not be afraid. Nature has a tonic that will quicken his spirit and toughen his muscles in a very short time. It is not a delusion like the balsam of Fierabras mixed by Cervantes' mad knight, but really does the work of knitting the frame into more solid mold and giving an endurance that will wrest alfalfa and cabbage from the ground by the wagon load. Plenty of fresh air, sunshine and good water, with the exercise of farm life fit the man of the desk to work shoulder to shoulder with the born farmer or the muscular mechanic. Health is a prize greater than the gold from his produce, that awaits the sedentary city toiler that takes to farming. To him the call of the soil should be the strongest.

The government is trying to throw every safeguard around those that settle under its irrigation systems and begin in good faith to establish homes. As will be seen, the very control of the water is given into the hands of the farmers themselves. Being their own managers, the future of these irrigation areas lies largely with the settlers.

Kindergarten for Inexperienced Irrigator.

Government aid does not end with the carrying of the water to the land, either. The United States does more for the inexperienced farmer than to turn over to him a tract of land with water and leave him to do the best he can. It establishes experts on the land to show the settler the best methods of using the water. It also gives information as to the soils and the best manner of working them, what crops are the most profitable and the best manner of cultivating them. It conducts virtual agricultural kindergartens in the way of experiment farms on the various tracts, giving guidance that is invaluable to the settler not familiar with irrigation farming. The trained farmers themselves develop many new truths by their constant experiments. The experts are glad to have the cooperation of these experienced husbandmen.

These simple regulations, which will show generally what is expected of settlers after the water is turned upon projects, were approved, published in the local papers and mimeographed for distribution by ditch riders upon the opening of the Truckee-Carson system:

1. Water is now running in the canals of the Truckee-Carson Project, and on April 1 the regular irrigation season will open. Water will be suplied to all farms entiled to receive it on and after that date, if gates, ditches and waste canals are ready for the proper handling of the water.

2. Farmers who desire water should notify the engineer in charge of the maintenance and operation of the system, or his duly authorized ditch tenders, by telephone, mail, or in person, at least twenty-four hours before water is needed, stating the amount of water and the length of run desired. Notice will in return be given of the time water will be turned on and the amount of head.

3. When water is to be turned off, notice should be given to the ditch tender or the office at Fallon at least twenty-four hours before the end of the run. Unless such notice is given water will be turned off at the time stated in the original request for water.

4. None but the ditch tender shall operate any gate or turn-out on the Project. All gates will be locked as soon as possible to prevent any unauthorized person from raising or lowering them.

5. Water entering any farm must be cared for by the owner or tenant throughout the period of the run. The head must not be lowered at night. Farmers are expected to care for water day and night. The drainage ditches are not to be used as waste ditches, except in cases of emergency. Waste water should be cared for on the farm and if waste water in any quantity runs off the place it will be taken as good evidence that the head is too great and the amount of water turned into the farm will he lessened accordingly. Any damage made by waste water entering drains must be repaired immediately by the persons responsible for the damage. Failure to attend to damage of this sort will result in water being refused the place until such damage is repaired.

6. Farmers and all others will confer a great benefit to the project if they will attempt to stop all breaks caused by weeds or obstructions in ditches. Breaks should be reported to the office or ditch tender at once if possible, but many times it will be less work to make a temporary stoppage of the leak. Maintenance of all lateral canals will be eventually turned over to the farmers.

7. All canals, laterals and ditches are the property of the Government of the United States and should be restricted accordingly. Cattle should not be allowed to water in ditches or drains. Bridges have been provided at convenient places and canals or drains should be crossed only at such points. No bridges,, culverts, boxes, fences or other structure should be built across any canal lateral or drain without written permission of the engineer in charge of maintenance and operation.

8. Where gardens are being cared for, special arrangements should be made for a garden head or small flow of water for irrigation of gardens more frequently than the ordinary land.

9. Complaints of irregularity of service or of inattention on part of ditch tenders should be made in writing to the engineer in charge at Fallon. Ditch tenders have no power to change instructions issued to them and any dissatisfaction caused by their acts should be reported to the office for correction.

TO the average farmer or man that has dealt in lands, any extended explanation of the homestead laws, except as they peculiarly apply to irrigated sections, would be superfluous. There are a vast number of city and town dwellers, however, who are ambitious to become possessors of tracts under the government projects and to these, all explanations of how land is obtained from the government will be of value. The subject will therefore be given some detailed consideration.

Locating a piece of land under the Homestead law is not wound up in as much red tape or fraught with as much difficulty as the average person that has never looked into the matter thinks. The expense is not heavy, either, the land office fees being in the neighborhood of $10 or $15. There is no charge for land taken up as homesteads.

The existing homestead laws will apply in the main to the location of farm units under the government irrigation systems. One important exception is that there can be no commutation. Every locator must be a citizen or have declared his intention to become one. He must be 21 years old or the head of a family.

Some new rules, made necessary by the different conditions, have been established and others will be made by the Secretary of the Interior from time to time, as occasion demands.

Commutation means the payment in cash for the land located under the terms of the preemption law after a residence of fourteen months and the making of the required improvements. This gives advantages in the way of removing timber and stone, besides an earlier possession.

This is the method set forth in the circular of the General Land Office at Washington for making application for a homestead:

To obtain a homestead, the party should select

Famous Act That Authorizes Reclamation Work

An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the 5 per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semi-arid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act. Provided, That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August 30, 1890, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts, established under the provisions of an act of Congress approved July 2, 1862," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from moneys in the Treasury not otherwise appropriated.

Section 2. That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction as well as of those which have been completed.

Section 3. That the Secretary of the Interior shall, before giving the public notice provided for in section four of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works. Provided, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than forty nor more than one hundred and sixty acres, and shall be subject to the limitations, charges, terms and conditions herein provided. Provided, That the commutation provisions of the homestead laws shall not apply to entries made under this act.

Section 4. That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding ten, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably. Provided, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon.

Section 5. That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding one hundred and sixty acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this Act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this Act.

Section 6. That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this Act: Provided, That when the payments required by this Act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: Provided, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the government until otherwise provided by Congress.

Section 7. That where in carrying out the provisions of this Act it becomes necessary to acquire any rights of property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney-General of the United States upon every application of the Secretary of the Interior under this Act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice.

Section 8. That nothing in this Act shall be construed as affecting or intended to affect or in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this Act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: Provided, That the right to the use of water acquired under the provisions of this Act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

Section 9. That it is hereby declared to be the duty of the Secretary of the Interior in carrying out the provisions of this Act, so far as the same may be practicable and subject to the existence of feasible irrigation projects, to expend the major portion of the funds arising from the sale of public lands within each State and Territory hereinbefore named for the benefit of arid and semi-arid lands within the limits of such State or Territory: Provided, That the Secretary may temporarily use such portion of said funds for the benefit of arid or semi-arid lands in any particular State or Territory hereinbefore named as he may deem advisable, but when so used the excess shall be restored to the fund as soon as practicable, to the end that ultimately, and in any event, within each ten-year period after the passage of this Act, the expenditures for the benefit of the said States and Territories shall be equalized according to the proportions and subject to the conditions as to practicability and feasibility aforesaid.

Section 10. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this Act into full force and effect. (32 Stat. L., 388.)

Approved, June 17, 1902.

and personally examine the land and be satisfied of its character and true description.

He must file an application, stating his name, residence and postoffice address and describing the land he desires to enter and make affidavit that he is not the proprietor of more than 160 acres of land in any State or Territory; that he is a citizen of the United States or that he has filed his declaration of intention to become such, and that he is the head of a family or over 21 years of age, as the case may be; that his application is honestly and in good faith made for the purpose of actual settlement and cultivation, and not for the benefit of any other person, persons or corporation, and that he will faithfully and honestly endeavor to comply with all the requirements of law as to settlement, residence and cultivation necessary to acquire title to the land applied for; that he is not acting as agent for any person, corporation or syndicate in making such entry, nor in collusion with any person, corporation or syndicate to give them the benefit of the land entered, or any part thereof or the timber thereon; that he does not apply to enter the same for the purpose of speculation, but in good faith, to make a home for himself and that he has not directly or indirectly made and will not make any agreement or contract in any way or manner with any person or persons, corporation or syndicate whatsoever, by which the title which he might acquire from the government of the United States should inure, in whole or in part, to the benefit of any person except himself; and, further, that since August 30, 1890, he has not acquired title to, nor is he claiming under any of the agricultural public land laws, which, together with the land he is seeking to enter, will exceed in the aggregate 320 acres, and that he has not theretofore had the benefit of the homestead law, and must pay the legal fee and that part of the commissions which is payable when the entry is made.

On compliance by the party with the foregoing requirements, the receiver will issue his receipt for the fee and that part of the commissions paid, a duplicate of which he will deliver to the party. The matter will then be entered on the records of the district office and reported to the General Land Office.

At the end of the prescribed period of residence a settler shall file with the register of the land office of the district notice that he desires to make final proof and the register shall advertise the fact. Applicants should make their final affidavits and proof in time to keep within the period prescribed for the acquirement of title. In case of the death of an entryman, his heir may make the final proof. No agent can do it.

About Leaves of Absence.

Where a homestead settler dies before consummation of his claim, the widow, or in case of her death, the heirs may continue settlement or cultivation, and obtain title upon requisite proof at the proper time. If the widow proves up, title passes to her; if she dies before proving up and the heirs make the proof, the title will vest in them.

Where both parents die, leaving infant children, the homestead may be sold for cash for the benefit of such children, and the purchaser will receive title from the United States, or residence or cultivation may continue for the prescribed period, when the patent will issue to the children.

Upon the death of a homesteader that leaves no widow, but both adult and minor heirs, the right to perfect entry passes alike to all the heirs. A homestead right can not be devised away from a widow or a minor child.

In case of the death of a person after having entered a homestead, the failure of the widow, children or devisee of the deceased to take up residence on the land within six months after the entry or otherwise to fulfill the demands of the letter of the law as to residence, will not necessarily subject the entry to forfeiture on the ground of abandonment. If the land is cultivated in good faith the law will be considered as having been substantially complied with.

The right of a homestead claimant who has become insane after the initiation of his claim may be proved up and his claim perfected by any person duly authorized to act for him during his disability.

Engineer's Summer Home in the Date and Pistachio Belt.

The general homestead laws make provision for leaves of absence in certain cases to be granted by the register and receiver. These are not to exceed one year at any one time. The applicant is required to give his own affidavit and those of other witnesses, which must be sufficient to satisfy the register and receiver that the applicant is unable by reason of a total or partial destruction or failure of crops, sickness or other unavoidable casualty to secure a support for himself or his family or those dependent upon him from the land settled upon.

No lands acquired under the provisions of the homestead laws are liable for the satisfaction of any debt contracted prior to the issue of patent.

As the law allows but one homestead privilege, a settler relinquishing or abandoning his claim can not thereafter make a second entry, although where the entry is canceled as invalid for some reason other than abandonment, and not the wilful act of the party, he is not thereby debarred from entering again if in other respects entitled, and may have the fee and commissions paid on the canceled entry refunded on proper application. Where the government takes a homesteader's land for reservoir or other purposes, he may locate another tract.

Settler Must Abide by Choice.

Where a party makes a selection for a homestead he must abide by his choice. If he has neglected to examine the character of the land prior to the entry, and it proves to be infertile, or otherwise unsatisfactory, he must suffer the consequence of his own neglect.

There are some cases though where obstacles exist that could not have been known at the time of entry, or where something develops afterward to render the land unfit for cultivation, through no fault of the homesteader, in which cases other entries are allowed.

It has been provided that parties having existing preemption rights may transmute them to homestead entries and perfect title under the homestead law though they have heretofore had the benefit thereof.

As each applicant must swear that he is well acquainted with the character of the land he describes and as all entries are subject to the right of prior settlers he can not make a true affidavit without having really inspected the land.

Registers and Receivers of the various land offices must give information, upon verbal or written request, as to whether particular pieces of land in their districts are subject to entry, but they can not be expected to supply extended information concerning the character and quality of land or to furnish extended lists of tracts subject to entry, except through the following plats and diagrams, which they are authorized to make and sell at the figures given:

Township diagram showing entered land only	$1.00
Township plat showing form of entries, names of claimants, and character of entries	2.00
Township plat showing form of entries, names of claimants, character of entry, and number	3.00
Township plat showing form of entries, names of claimants, character of entry, number, and date of filing or entry, together with topography, etc.	4.00

When a homesteader applies to make entry he must pay in cash to the receiver a fee of $5 if his entry is for 80 acres or less, or $10 if he enters more than 80 acres, and in addition to this fee he must pay, both at the time he makes entry and final proof, a commission of $1 for each 40-acre tract entered outside of the limits of a railroad grant and $2 for each 40-acre tract entered within such limits. On all final proofs made before either the register or the receiver or before any other officer authorized to take proofs, the register and receiver are entitled to receive 15 cents for each one hundred words reduced to writing, and no proof can be accepted or approved until all fees have been paid.

A. P. DAVIS
Chief Engineer Reclamation Service

In all cases where lands are entered under the homestead laws in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming the commission due to the register and receiver on entries and final proofs, and the testimony fees under final proofs, are 50 per cent more than those above specified, but the entry fee of $5 or $10, as the case may be, remains the same in all the States.

United States commissioners, United States court commissioners, judges, and clerks are not entitled to receive a greater sum than 25 cents for each oath administered by them, except that they are entitled to receive $1 for administering the oath to each entryman and each final proof witness to final proof testimony, which has been reduced to writing by them.

In addition to his farm unit the settler may take up enough grazing land to fill out the total number of acres allowed under the homestead laws. This will be a great help on some of the projects where the watered land is not in the richest class.

How Relinquishments are Transferred.

A question that will naturally be asked by the city dweller that is not as familiar as the farmer with the homestead laws is what a locator who has lived part of his time on a piece of land and finds that he can not remain and perfect title is going to get back for the improvements he has made, and the toil he has spent in bringing his farm unit into cultivation. This is a serious matter to many that do not know whether they may be able to remain the five years that are necessary to obtain a water right and a patent to the land.

There need be no fear of loss on this account. It is conceded that the homestead laws permit a settler to sell his improvements—that is house and barn, corrals, windmill or pump and such. The homestead law expressly says, however, that relinquishments of filings can run only to the government and that, when made, the land affected is open for location by the first eligible person that applies. This is well enough, but it happens that the person that buys the withdrawing settler's improvements is always the first person to make the new filing. He can pay whatever price he wishes for the improvements, and it is usually greatly in excess of their value, thus compensating the retiring settler for the time he has spent and work he has done.

The method of making one of these transfers by relinquishment is described as follows by a business man residing in one of the newly opened tracts:

> When a sale of this kind takes place the parties interested usually come to the bank, the party selling placing his relinquishment in their hands and the party buying placing the sum involved there also. The bank then protects each by delivering the relinquishment to the purchaser, who takes it to the land office and files it and at the same time places his filing on the land. When the land office issues a receipt showing the purchaser has filed, then the bank turns over the money to the party selling the improvements. If there is any legal reason preventing the new filing, such as a contest, the purchaser does not file the relinquishment, but returns it to the bank and is then entitled to the return of his money. In this way many of the farm units on this project have changed hands several times.

Speculator is the Greatest Evil.

This may be termed an evasion of the law, though it only carries out the rule that the first to apply shall have the filing, but it has a virtue in that it saves many an honest man from loss of his time and toil. There are numbers of men that locate farm units with the best intentions of improving them and acquring title, but who find, maybe after living nearly the whole of the requisite five years on their locations, that they must leave. There are many reasons that are no detriment to the quality of the land or the region in which it lies that might make it necessary for a settler to "pull up stakes" and go elsewhere. In such cases it would certainly be a hardship that all his effort should go for nothing.

Unfortunately though, that bane of the new reclamation, the speculator, finds his loophole under this practice. He can file on a good piece of land with no intention of farming it and charge a fancy price for a relinquishment to some honest settler that comes in to build his permanent home on the tract.

On all the projects where there was a large percentage of public lands nearly every unit has been filed upon before the opening. In cases where the land was good many of these filings were made by men that intended to acquire title and build homes, but in too many cases they were made by those that had no other intention than to sell at a profit.

D. C. HENNY
Supervising Engineer, U. S. Reclamation Service for Oregon, Washington and Northern California

It is gratifying to know that a great many of these speculators who blocked the way at first for the homebuilders made little or nothing from their ventures and wasted their time and money.

The keen eye that the government is keeping on land locations under the projects was shown by the cancellation this fall of 150 entries at Fallon, Nevada, that had been made by speculators. Every chance was given these insincere locators to fulfill the conditions prescribed for the acquiring of the units, but they showed by not living on the land that they did not intend to make homes there. These cancellations will become of record next March and the units may be located by genuine settlers.

Numerical Expressions
Used in
Hydraulic Engineering.

Some explanation of numerical expressions in measuring water for readers that are not familiar with the technical terms employed by engineers will be found of value in reading the descriptions of the Reclamation Projects. The standard unit for smaller standing bodies of water, as lesser reservoirs, is the cubic foot. For larger reservoirs the acre foot is the standard. This is the amount of water that will cover one acre of land a foot deep, which is 43,560 cubic feet. One cubic foot per second for 24 hours equals two acre feet. With running streams, such as rivers or canals, the time unit is usually expressed by the second foot and the measurement by the cubic foot. The number of second feet in a stream is the number of cubic feet that passes a given point each second. A miner's inch is supposed to be the amount of water flowing through an aperture an inch square, but this varies with the pressure. There are mechanical contrivances for measuring all these flows.

It follows that there is still plenty of chance for the genuine settler even under projects where the land has all been mostly filed upon. The speculators are abandoning locations outright or are selling relinquishments, sometimes very cheap. A number of locators that had genuine intentions of remaining are selling, too, for various private reasons.

May Pay for Water in Five Years.

It is understood that if a settler wishes he may pay for his water right in five years and get full title to that and his land at the end of that period. If he takes ten years he must reside on the land until all the payments are made.

Locators of farm units may buy lots in the

Plenty of Water in Sight.

townsites set aside by the government. This constitutes a profitable investment, as all the towns grow rapidly after the systems are opened.

Purchasers of tracts of private land are not compelled to buy water rights, but they can get no use of the water without doing so. There is nothing to prevent a homesteader buying a tract of private land. Persons that live in town may acquire farms on the private tracts, for under the ruling anyone that owns one of the units on "excess" lands may obtain a water right if he lives within twenty miles of it.

Withdrawal for Townsites.

There was approved on April 16, 1906, an Act giving to the Secretary of the Interior power to withdraw from public entry lands needed for townsites in connection with the irrigation projects. This Act provides that the sites shall not be larger than 160 acres in each case, but the limitation has been removed. The subdivision into lots, appraisement by the Secretary, and sale by public auction, no lot to be sold for less than the appraised valuation, is provided for. The auctions are to be held from time to time and such lots as are not disposed of at auction may be sold under the direction of the Secretary for not less than their appraised valuation. The proceeds are to be added to the reclamation fund.

Reservations for public purposes are to be made in the townsites and these are to be maintained at the expense of the various municipalities. A sufficient supply of water shall be furnished them upon payment of the pro rata of cost to the government under the same conditions governing a private user. These municipalities are given the preference for the leasing of surplus power that may be developed, such leases, either to towns or to private interests, not to exceed ten years.

Settlers who had located on lots in the townsites of Rupert and Heyburn in Idaho and erected permanent buildings were permitted to purchase the lots ocupied by them at an appraised valuation.

Another Act, approved June 27, 1906, permits the Secretary of the Interior to establish farm units of not less than ten acres under projects where smaller acreage is sufficient to maintain a family.

Indian Reservations Opened.

The several Indian Reservations that are under Reclamation projects have been ordered opened to settlers, with a sufficient reservation for the Indians and the further protection of part of the funds derived from the sale of excess lands that were owned by the tribes. An Act approved June 21, 1906, protects all treaty rights of Indians and provides that any Indian allotted lands under any law or treaty without the power of alienation—which lands are under reclamation project—may sell them under rules prescribed by the Secretary, and when such sale is approved it shall convey full title, the same as if final patent had been issued. The money shall be held to pay the construction and maintenance charges against the unsold part of the allotment and any surplus shall be a benefit running with the water right, to be paid to the holder of it.

There is reserved for each Indian under the Yuma Project and those in the Pyramid Lake Reservation, in Nevada, five acres of irrigable lands. It is provided that the surplus above the cost of reclamation shall be used for the benefit of the Indians.

Public Land Under Projects.

The amount of public land under each project at the time of beginning work on the irrigation system can be had from the following resume of the various classes of land:

Salt River Project, 200,000 acres, all Government land; Yuma 92,150 acres, 27 per cent Government, including Indian reservation; Uncompahgre Valley, 146,886 acres, 20 per cent Government, some railroad, rest private; Minidoka, 150,000 acres, 25,000 state, rest public; Payette-Boise, 372,000 acres, one-quarter public land; Garden City, 8300 to 15,000 acres, all private land; Huntley, 33,000 acres, all but 10 per cent public; Milk River, 200,000 acres, one-half public; North Platte Project, 202,000 acres, 65 per cent public; Truckee-Carson, first unit 200,000 acres, 70 per cent public, part railroad and Indian reservation lands, rest private; Carlsbad, 20,000 acres, private; Hondo, 10,000 acres, private; Rio Grande, 180,000 acres, 25,000 acres in Mexico, 20 per cent public, rest private, including Leashurg diversion area at Las Cruces; Williston district—three pumping systems—37,500 acres, 20 per cent public; Lower Yellowstone, 66,000 acres, 35 per cent public; Umatilla, 20,000 acres public land consisting of alternate sections patented to Oregon Railroad and Navigation Company; Klamath, 220,000, 23 per cent public, but all public land covered by lakes at present; Eelle Fourche, 100,000 acres, one-half of which is public; Strawberry Valley, 50,000 acres, private; Okanogan, 10,634 acres, 10 per cent public; Tieton Project, 24,000 acres, all private; Sunnyside, 86,900 acres, practically no public land; Shoshone Project, 125,000 acres, all but 2 per cent public; Orland, 15,000 acres, all private.

THE road traveled by the government in accomplishing all it has in the work of reclamation has not been an easy one and therefore the results attained to date are all the more remarkable. In writing of the "obstacles to reclamation" in the Fourth annual report, Director Newell of the Service says that the progress already made in carrying out the terms of the Reclamation Act has been achieved during all the time in the face of obstructions from physical and human agencies, "the latter being perhaps the most difficult to overcome." He gives as the physical obstacles those of lack of water supply, defective foundations, poor material for construction and soil of doubtful value. Under no one project he says are all the conditions for conserving water good. In some localities there is a fine reservoir site and no water and then where there is plenty of water there may be no reservoir site. The ingenuity of the service engineers is taxed at all times to overcome these drawbacks.

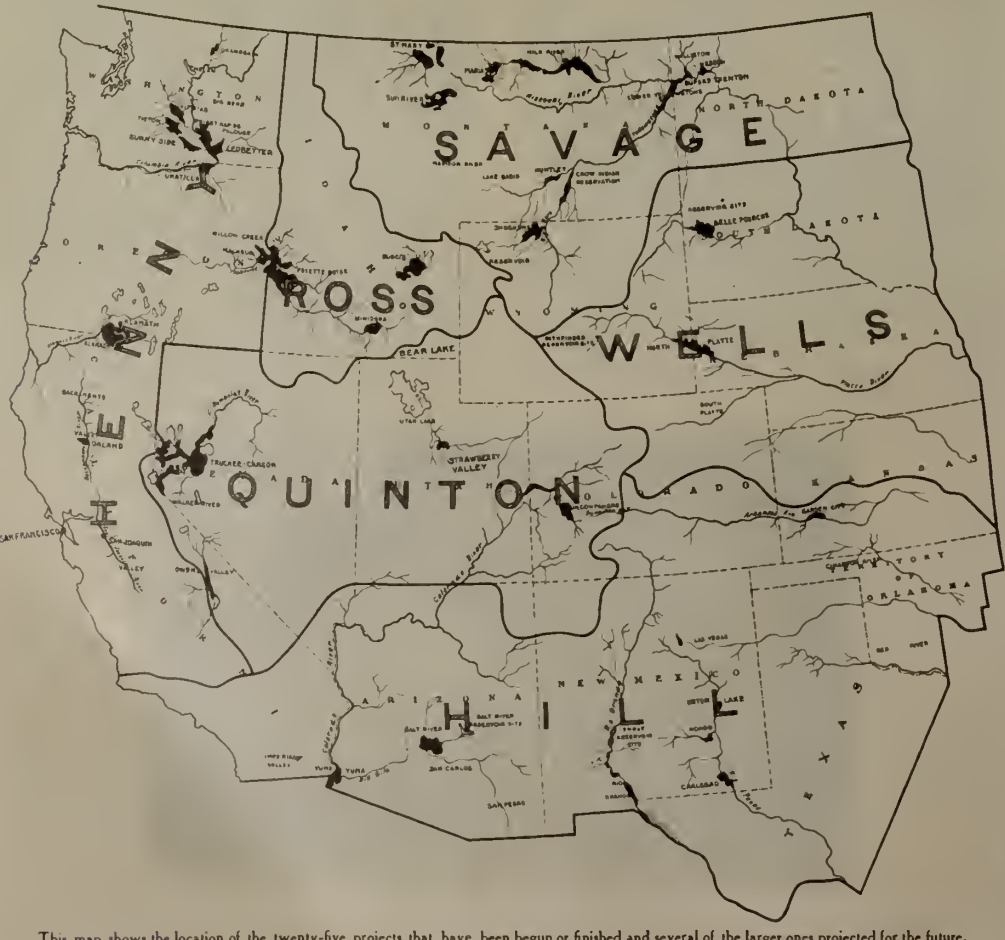
The human obstacles are declared by Engineer Newell to be the most difficult ones, though. "These," he says, "consist of defective laws, vested and intangible rights, disinclination to adopt irrigation, and the general desire to give as little as possible for the largest benefits." In some "notably exceptional" cases the individuals and communities have eagerly co-operated with the reclamation officials. In others the Director has discovered a feeling among the people that money must be spent in their locality and that the benefits would come anyway, even if they sat back and did nothing.

Townspeople Favor the Work.

In the regions that are truly arid and where efforts have been made to reclaim land by the citizens, who know in those regions what irrigation really means, there has been little delay. In the sub-humid regions, however, where so-called 'dry' farming is usually successful, the obstacles have been great, and this in face of the fact that a proper supply of water immensely increases the production from the land and sends its price up to a far higher figure.

Dry Farming Merely Farming without Irrigation.

The townspeople and the speculators everywhere are anxious to have the government money spent in their localities on any kind of work, no matter what the result. The lands in the sub-humid regions have as a rule been occupied for a long time by settlers who are doing fairly well at dry farming and they—who must ultimately pay the entire cost of irrigation and must virtu-



This map shows the location of the twenty-five projects that have been begun or finished and several of the larger ones projected for the future.

ally change their entire methods in order to practice intensive cultivation—are not so eager as the other two classes of people to enter into the irrigation plan. They want to be let alone and cannot see why they should be annoyed or disturbed in the peaceful possession of their farms in order to try what appears to them to be a doubtful experiment.

The question of the future return of the reclamation fund is always uppermost in the minds of those administrating the Act, Director Newell says. Every possible effort has been made to prevent a wasting or loss of the investment and the greatest possible skill and forethought must be used, he asserts. Predictions have been made, he adds, that after the fund has been invested it will be impossible to get back more than a small portion of it. Some failures and removals may be expected, he thinks, but the advanced value of the land, due to the increased population, will permit the unsuccessful man to dispose of his holdings to someone that will put his shoulder to the wheel more determinedly and succeed.

Labor is Hard to Get.

One of the most "serious and complex" problems with which the engineers had to deal, Mr. Newell finds, has been that of labor. Extended railroad construction in the West has created a heavy and exceptional demand for all sorts of laborers and has made the retaining of the men for long periods by the government almost impossible. Men are ever restless and it has been noted as one of the characteristics of those employed on outdoor construction work that they are nomadic and will, on the slightest pretext, gather their belongings and move to another contractor's camp. The Gunnison Tunnel pay rolls show that only about twenty-five per cent of the men there are permanently employed. The others work for from one to thirty days. The rolls usually contain from eight hundred to nine hundred names a month, while the total number of men employed at any one time does not exceed, probably, four hundred and fifty. Contractors have been forced to ship men from the large centers and in many cases they do not stay long enough to repay the cost of their fare.

Effectiveness of labor has been decreased by its scarcity. The knowledge that jobs can be obtained easily does not induce the men to any extraordinary exertions. They will not stand to be driven.

Strict enforcement of the beneficent eight-hour law on the reclamation undertakings has added greatly to the cost of the work being performed by the government. As the reclamation is being carried on for the people, though, it is right that the laboring man should be given the most it is possible to give him.

The tremendous development of the West caused an actual pause in the Reclamation efforts during this year. With a virtual construction boom in progress in all the inter-mountain country, it has been hard to find contractors that would submit what the government deemed reasonable bids for the irrigation work. Railroad work has been so great as to give all the larger contractors all they could do and the smaller ones have been busy with lesser jobs in and about the cities. Many contracts for government work have been advertised more than once without result. The Lower Yellowstone project contract was advertised twice without producing bids and then as an inducement informal proposals for the construction in large or small sections were asked. There was but one submitted and the price was deemed far too high.

Government Completes Abandoned Contracts.

The government has taken up contract work that had proved, too much for corporations or individuals and carried it to completion itself with satisfaction and profit, but at the present time all sorts of material are so high that the Service hesitates to go ahead with work on its own account. Lumber and cement have doubled and horses and mules are worth twice as much as they were when the reclamation work was begun. Labor is demanding and receiving from forty to sixty per cent more than it did when the reclamation efforts were inaugurated. The remoteness of much of the government work causes a large percentage of the skillful and steady labor to stay away from it.

In regions where there are Indians or other sorts of local laborers, they have been pressed into service. At Yuma the fiery Apache has settled down to handling the shovel and such other implements as are necessary in building dams and ditches. Mexican labor is also employed there as on the Rio Grande Project. Indian labor is found useful on some of the Northwestern projects.

On the Roosevelt dam, Geronimo's bloodthirsty followers, that once terrorized Arizona, are at work with shovel and pick. The American bayonet has driven them to a more useful if less romantic life than was theirs in days agone and has subdued them just in time to make them a help to the government, instead of a very sharp thorn in its side. These cowed terrors of the cactus land built the sixty-two miles of road over which the material for the construction work and the camp supplies were hauled. The Reclamation work is productive of oddities as well as marvels.

Secretary Calls Temporary Halt.

The Secretary of the Interior last April issued the following general instructions to the Director of the Reclamation service in regard to the temporary lessening of work because of increased expense and other conditions:

> Concentrate and give preference to the works upon which construction is nearly completed, and where the projects will soon be producing revenue. Discontinue further expenditures for general investigations. Arrange wherever practicable for the reduction or suspension of work on projects

Date Palm of America's New Syria.

which are so located that favorable bids for construction have not heen secured.

Recommend for restoration to entry all lands now reserved under the terms of the Reclamation Act, the reclamation of which can not be undertaken in the near future; withholding, however, all reservoir sites, or lands which may be required for rights of way for future works whose practicability has been determined.

In explaining these instructions, the Secretary said:

Conditions have altered so materially since the first estimates of cost of construction were made and the allotment of the fund approved, that I have deemed it well to advise that a reduction of the work in some instances and a suspension in others be considered. It would be most unwise to continue work where circumstances are so disadvantageous or to incur expenses which in the future may be considered as unduly large.

By concentrating on those works now nearing completion, new revenues will be coming into the fund; and when the labor conditions and transportation facilities become normal, the work on other projects can go forward more economically and with greater rapidity. The expenditures during the last quarter have averaged about $1,500,000 a month. At this rate the funds available for new construction will be exhausted before the end of the calendar year.

The Service is greatly gratified by the comparison of the cost of the great dams it is putting in and that of the mammoth one at the Croton Reservoir in New York, and the Wachusett in Massachusetts, which were looked upon as the greatest works of the sort in the world. The western dams have some advantages of building though, that have had much to do with the great disparity in the cost bills.

Of the Reclamation Service dams of the first magnitude, the Roosevelt is two hundred and eighty feet high from foundation stones to parapet, Pathfinder two hundred and ten feet, Shoshone three hundred and eight feet. Of the dams not built by the government, the New Croton is two hundred and ninety-seven feet high and the Wachusetts two hundred and seven feet. This measurement makes the Shoshone the highest, the New Croton second and the Roosevelt third. Calculating from the height above the river bed, the storage height, the New Croton is lowest. They then run, Shoshone two hundred and forty feet, Roosevelt two hundred and thirty feet, Pathfinder two hundred feet, Wachusetts one hundred and eighty-five feet, New Croton one hundred and fifty-seven feet.

The New Croton is the largest dam in the world from the standpoint of masonry used, but the storage capacity of the reservoir behind it is lower than that of any of the other dams mentioned. The New Croton contains 833,000 cubic yards of masonry and was constructed at a cost of $7,600,000. The capacity of the reservoir is 4,000,000,000 cubic feet, giving a cost of $1900 for each 1,000,000 cubic feet of storage. The Wachusett contains 280,000 cubic yards of masonry and cost $2,000,000. Its storage capacity is 8,400,000,000 cubic feet—a cost of $238 for each 1,000,000 cubic feet.

Greater than Assouan Reservoir.

Here are the remarkably contrasting figures of the big Western dam: The Roosevelt will contain 350,000 cubic yards of masonry that will cost only $3,850,000 to put in the form of a dam. The reservoir capacity reaches the enormous figure of 61,000,000,000 cubic feet, fifteen times that of the New Croton and about seven and a half times that of the Wachusett. The cost for each million feet of storage is the very low sum of $63.16. The Pathfinder dam beats this. It will contain 53,000 cubic yards of masonry that will cost $1,000,000 to erect. Its reservoir capacity is 43,560,000,000 cubic feet—more than ten times that of the Croton. The cost of this dam per each million feet of storage reaches only $22.95. For the Shoshone, the highest dam in the world, the figures are: Cubic yards of masonry, 69,000; cost $1,000,000; reservoir capacity 20,000,000,000 cubic feet; cost per million feet storage $50.35. The Elephant Butte dam not yet begun, will be larger than any other.

This is a comparison of Tonto (or Roosevelt), Pathfinder, Shoshone, New Croton, Wachusett Dams.

	Tonto	Pathfinder	Shoshone	New Croton	Wachusett
Length at Crest—Feet..........	650	226	175	1,168	850
Height Above Foundation........	280	210	308	297	207
Maximum Effective Storage Height —Feet	230	190	240	157	185
Thickness at Base—Feet.........	158	94	108	206	185
Thickness at Crest—Feet........	16	10	10	18	25
Cubic Yards of Masonry........	350,000	53,000	69,000	833,000	280,000
Capacity of Reservoir — Million Cubic Feet	61,000	43,000	19,863	4,000	8,400
Cost of Dam—Dollars..........	3,850,000	1,000,000	1,000,000	7,600,000	2,000,000

Egypt's great reservoir behind the Assouan dam, holds 35,000,000,000 cubic feet of water, less than any one of the three larger ones already planned by the United States. This dam and reservoir will be the largest in the world until the larger ones in this country are completed. The Assouan dam is one and one-quarter miles long and its height from bedrock one hundred and thirty feet. The weight of masonry is 1,000,000,000 tons. The difference in the level of the water above and below is sixty-seven feet. There are one hundred and eighty sluice gates, twenty-three one-half feet high and six and one-half feet wide. Navigation is provided by a ladder of four locks, each two hundred and sixty feet long and thirty-two feet wide.

At present about 300,000 acres of land are watered through these works, but it is intended to add to the height of the dam in the years to come, so that double that amount will be brought under ditch.

It is the low cost of the government works that makes the plan of irrigation feasible. The lands could not stand such a tax as would be imposed by the construction of reservoirs at the expense incurred in building the New Croton and the Wachusett. The estimated cost per acre for water under the Roosevelt dam is $35. Had the Croton dam been put in there it would have supplied only 23,000 acres, as against 200,000 and this water would have cost $330 an acre. Nearness of the principal material used in construction, timber, stone, and earth, and in some cases lime deposits, helps keep down the cost of the government works.

Up to this time the Reclamation Service has put water on about 300,000 acres, or nearly one-fifth of the total acreage of the first units planned and the next year will see that doubled. Several units will be brought to completion about the same time in 1908. Some of the projects under way are among the most important that will ever be carried out during the progress of this great work.

One of the oddities of the new reclamation. Giant cactus of old desert finds itself surrounded by alfalfa field.

OFFICIAL records show that the total set aside for projects actually under way, for those for which bids have been received and those that have been approved by the Secretary of the Interior is $32,870,000. A compilation of figures from government reports gives 1,685,300 acres as the total to be watered under the first units of the twenty-five projects at a cost of $60,000,000, and 3,028,300 as the total acreage that these projects will eventually cover with ditches at a cost of $109,000,000, if preliminary investigations hold. Still more money must be set aside to complete these opening projects.

Varying estimates are made of the total acreage that ultimately will be reclaimed in the States and Territories embraced in the Act. The nearest to official is 6,300,000 acres, at a cost of $200,000,000. Another estimate is 10,000,000 acres. The figures at the smallest indicate a final result of great magnitude. Some enthusiast has said that "if the work is carried out as contemplated today, an area of desert and semi-productive land two-fifths as large as the present cultivated area of the United States will be reclaimed. The total expense of this work will be $1,500,000,-

000, and the estimated value of the land brought under water $3,000,000,000, providing homes for 5,000,000 farmers."

There is enough in the future of this work, at any rate, to make it a crowning glory. With the revolving fund virtually a continuous chain scheme, all the money paid out for projects must flow back, over and over again, in the payment for water rights.

Total Value of Reclaimed Lands.

Some of this money will not be returned in the first ten years, for there will doubtless be settlers that will become tired of farming, or for various reasons will be unsuccessful in their first efforts and default. But it will all come back in time for eventually title to every foot of the reclaimed land and every water right will rest in someone. Thus the reclamation work need never end until every feasible project has been carried out.

The total acreage that it was thought could be reclaimed has diminished somewhat through the discovery by the reclamation engineers that some tentative projects that seemed favorable have proven not feasible, either because of poor soil or cost of taking water to the land.

The average value of irrigated land in the United States is placed by experts at $47 an acre. The value of the land to be reclaimed under the first twenty-five projects therefore, will be $142,330,100. The average annual income from irrigated land in the West has been placed at $25 an acre—which, by the way, if correct, would give the land a far greater value than $47. This estimate will add $75,707,500 a year to the country's agricultural wealth.

It is estimated that there will have been received from the payment for water rights at the end of ten years $25,000,000 and double that at the end of twenty years. This will all go back into new projects.

Resume of the Projects.

The following is a brief resume of the twenty-five projects as far as tangible figures can be secured today:

Sun river, Montana. First unit 24,000 acres. Cost $25 an acre or total to be $600,000. Annual revenue $60,000. Ultimate total to be reclaimed, 270,000 acres.

Huntley, Montana. Total to be reclaimed, 320,000 acres. Estimated cost per acre, $30. Total cost, $960,000. Annual revenue, $105,000.

Lower Yellowstone, Montana-North Dakota. First unit, 50,000 acres. Cost $33 an acre. Total of first unit, $1,650,000. Annual revenue, $165,000. Total to be reclaimed, 66,000 acres.

Shoshone, Wyoming. First unit, 90,000 acres. Cost per acre, $32 or total of $2,880,000. Annual revenue, $288,000. Total to be reclaimed, 125,000 acres.

North Platte, Wyoming-Nebraska. First unit, 90,000 acres. Cost per acre $30. Total of first unit, $2,700,000. Annual revenue, $270,000. Total area to be watered, 125,000 acres.

Truckee-Carson, Nevada. First unit, 200,000 acres. Cost $26 an acre. Total cost of first unit, $5,200,000. Annual revenue, $520,000. Total to be watered, 400,000 acres.

Hondo, New Mexico. First unit. 10,000 acres. Cost. $27.50 an acre. Anual revenue, $27,500. Total to be watered, with Urton reservoir project, 85,000 acres.

Carlsbad, New Mexico. First unit, 20,000 acres. Total cost, $600,000. Cost per acre, $30. Annual revenue, $60,000.

Rio Grande, New Mexico-Texas-Mexico. Total of 180,000 acres. Of this about 155,000 are about Rincon, Las Cruces and El Paso and 25,000 in Mexico. First unit, 15,000 acres. Cost, $30 an acre. Total, $450,000. Annual revenue, $45,000.

Belle Fourche, South Dakota, project, 100,000 acres to cost $33 an acre; total cost, $3,300,000; annual revenue, $280,000.

Salt River, Arizona, project, 200,000 acres, to cost $35 per acre; total cost, $7,000,000; annual revenue $700,000.

Yuma, Arizona, project, 86,700 acres, to cost $35 an acre; total cost first unit, $3,044,500; annual revenue, $304,500.

Uncompahgre, Colorado, project, 150,000 acres, to cost $36 an acre; total cost, $5,250,000; annual revenue, $525,000.

Minidoka, Idaho, project, 60,000 acres, to cost $26 an acre; total cost first unit, $1,560,000; annual revenue, $156,000; total area to be reclaimed, 130,000 acres.

Payette-Boise, Idaho, project, 60,000 acres, to cost $60 an acre; total cost first unit, $1,800,000; annual revenue, $150,000; total area to be watered, 370,000 acres at cost of $7,000,000.

Garden City, Kansas, project, 8600 acres to cost $30 an acre; total cost, $258,000; annual revenue, $25,000. Perhaps 7000 acres more will be watered.

Umatilla, Oregon, project, 20,000 acres, to cost $60 an acre; total cost, $1,200,000; annual revenue, 120,000. Ultimate total, 78,000 acres.

Klamath, Oregon-California, project 130,000 acres, to cost $20 an acre; total cost of first unit, $2,600,000; annual revenue, $260,000; total area to be watered, 220,000 acres.

Sunnyside, Washington, project, 40,000 acres, to cost $45 an acre; total cost of first unit, $1,800,000; annual revenue, $180,000; total area to be watered, 85,000 acres.

Tieton, Washington, project, 24,000 acres, to cost $60 an acre; total cost, $1,440,000; annual revenue, $144,000.

Okanogan, Washington, project, 10,600 acres, to cost $55 an acre; total cost, $583,000; annual revenue, $58,300.

Milk River, Montana project, 175,000 acres, to cost $26 an acre or a total of $4,550,000, will not be completed quite as soon as the other.

Strawberry Valley, Utah, project, 50,000 acres to cost $20 an acre; total, $1,000,000; annual revenue $100,000.

Orland, California, project, 15,000 acres at $40 an acre; total $600,000; annual revenue, $60,000.

Trenton-Buford, Williston and Nesson, North Dakota, project, 40,000 acres, to cost $30 an acre; total cost $1,200,000; annual revenue, $120,000.

THE cost of establishing oneself on an irrigated farm and beginning its cultivation is something that intending settlers must consider carefully. There is a house to be constructed, fences to be built, sometimes brush or other growth to be grubbed off, land to be broken, levelled and checked for irrigating. Some livestock, including horses and at least one cow and various farm implements, most of them built particularly for use in irrigation farming, must be had. Such things in the way of implements and supplies that cannot be bought at the tract where the farmer is to settle must be shipped from a distance and freight must be considered. When a tract is opened, however, it is not long before there are large merchandise stores and lumber yards carrying nearly all that settlers are likely to need.

It is conceded that from $500 to $1000 in cash is required by every new settler. The latter sum is the more generally given as the needed amount. There is a period before the first crops are harvested, when it is all expense for the farmer. By working for the contractors on the government work, there is a chance for those with less money to carry themselves along. It is a much harder proposition under some projects than under others. Conditions vary with the climate, which is severe in winter under some of the projects; the adaptibility of the soil surface for leveling and the fertility of the land.

What New Settlers Need.

Here is a letter from one of the projects in the colder region telling what a settler needs:

> In order to properly establish oneself on one of those farm units one ought to have at least $1000. Of course I do not mean that a person ought to have that in cash, but he ought to have a team, some household furniture, a cow or two, some hogs and some chickens and money enough to maintain himself for about a year, besides enough to build him some sort of a house.
>
> Where some of the settlers have made a mistake is in building up large buildings on their holdings before they get any of their land under cultivation. My advice to any settler would be to get along with just as little buildings as he possibly can until the water is actually applied to the land. In that way the settler can spend much more time in getting his land fit for crop the first year. The person who goes on to the land and has it all plowed up so he can put in crop the first year will be able to stay and pay out, but the person who has to make a payment on his water right before he has had any returns from his land will not be able to win. The theory on which the government is acting under the reclamation law is that the farmer is to pay for the water right out of the products of the land. The man who does not get his land in crop the first year the water is applied will have to make a payment without deriving any revenue from the land.
>
> It is very hard to tell the percentage of failures there are, for the reason that there are so many speculating in the government land. A great many file on land with no intention of holding it, but for the purpose of selling their relinquishment later on. Some of the filings have changed hands five or six times. I think that fully 25 per cent of the present entry men who are now holding land will eventually sell their holdings. It is hard to tell just whether to call this a failure or not. I am of the opinion that all the land entered will have changed hands before a permanent holder will get it.

Helps Prevent Race Suicide.

The Roosevelt irrigation policy will work in excellent co-operation with his "race-suicide" warning. In fact it looks as if he had worked out the latter in conjunction with his advocacy of large families. The president doesn't stop with reminding parents of their duty in the matter of swelling the census. He backs up legislation that provides homes for them and their offspring. While telling heads of families their duty to their country in the way of adding to the population, he sweeps his arms toward the setting sun where his reclamation men are busy carving out homes for just the large families that their chief views with such delight. Parents cannot say to the president, "Show us a way to feed them and we will provide the children." He has shown the way.

Life beyond the walls of the sordid cities where men wore out their bodies and warped their souls in the fierce struggle for mastery had instilled this president with a love for that inspiring, uplifting world of forest and plain that was to help bring about mighty results in the greater upbuilding of the nation and the happiness of those that needed homes.

The Western people had carried on an agitation for this work of reclamation for years and legislation that would bring water to the lands under government aid had been revolved in the brains of many statesmen of the West long before the final agreement on what is known as the Newlands Act—that under which the work is being carried on—was reached. The act was passed with the President behind it with his full enthusiasm for measures that aid the upbuilding of new regions, the conservation of forests and the bringing of new lands into cultivation.

The Act was formerly approved by the President on June 17, 1902. On February 25, 1905, he approved a measure extending it to Texas. This was to cover the Rio Grande Project with head works at Elephant Butte, opposite Engle, New Mexico, under which 180,000 acres of land in New Mexico, Texas, and Mexico are to be irrigated. The original act provided for work in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming.

Dealt with Matter in Message.

Perhaps had Roosevelt not been president, there would be no Reclamation of arid lands by government enterprise under way today. He was the first president to deal openly with this subject in a message, and his statements to Congress on it were strong. In dissecting his message of December, 1901, a magazine at that time said:

> The president draws upon his personal experience in treating of the Forest Reserves in their relation to the Department of Agriculture. He asks power to transfer to that department lands for forest reserves as he now has power in the case of lands needed by the Departments of War and the Navy. He reveals an interesting and intimate acquaintance with the usefulness of trees, grasses and general forest preservation. This topic brings him directly to that of arid public lands. This is a huge subject. It involves making habitable an area of country in the West capable of supporting a population equal to the present population of the United States. It is the first time in our national history when the project of building irrigation works by the national government has been advocated openly by a president. But Mr. Roosevelt declares that this should be done and that the lands reclaimed by them should be reclaimed by the government for actual settlers, and the cost of construction

should so far as possible, be repaid by the land reclaimed.

Strong Letter to Boise Congress.

The letter of President Roosevelt to the Irrigation Congress that convened in Boise in 1906 is one of the important documents in connection with the progress of the Reclamation Work. The president begins with praise for the rapid progress made by the "400 skilled engineers and experts" of the service, with the 10,000 men and 5,000 horses employed at that time, and continues:

> The period of general surveys and examinations for projects is past. Effort is now concentrated in getting the water upon a sufficient area of irrigated land in each project to put it on a revenue-producing basis. To bring all the projects to this point will require upwards of $40,000,000, which amount, it is estimated, will be available from the receipts from the disposal of public lands for the years 1901-1908.
>
> We may well congratulate ourselves upon the rapid progress already made, and rejoice that the infancy of the work has been safely passed. But we must not forget that there are dangers and difficulties still ahead and that only unbroken vigilance, efficiency, integrity and good sense will suffice to prevent disaster. There is now no question as to where the work shall be done, or the precise way in which the expenditure shall be made. All that is settled. There remains, however, the critical question of how best to utilize the reclaimed lands by putting them into the hands of actual cultivators and home-makers, who will return the original outlay in annual installments paid back into the Reclamation Fund: the question of seeing that the lands are used for homes and not for purposes of speculation or for the building up of large fortunes. It is easy to make plans and spend money. * * * But when the time comes for the government to demand the refund of the investment, under the terms of the law, then the law itself will be put to the test and the quality of its administration will appear.

Land Grabbing a Pressing Danger

> The pressing danger just now springs from the desire of every man to get and hold as much land as he can whether he can handle it profitably or not, and whether or not it is for the interests of the community that he should have it. The prosperity of the present irrigable areas comes from the subdivision of the land and their consequent intensive cultivation. With an adequate supply of water a farm of five acres in some parts of the arid West, or of forty acres elsewhere, is as large as may be successfully tilled by one family. When therefore a man tries to hold 160 acres of land completely irrigated by government works, he is preventing others from acquiring homes and is actually keeping down the population of the State.
>
> Speculation in lands reclaimed by the government must be checked at whatever cost. The object of the Reclamation Act is not to make money, but to make homes. Therefore, the requirement of the Reclamation Act that the size of the farm unit shall be limited in each region to the area which will comfortably support one family must be enforced in letter and in spirit.
>
> Until it has been proved that this great investment of $40,000,000 in irigation made by the government will be returning to the treasury, it is useless to expect that the people of the country will consider direct appropriations for the work. Let us give the Reclamation Service a chance to utilize the present investment a second time before discussing such increase. I look forward with great confidence to the result.

Irrigation and forestry, the latter conserving the water supply that feeds the rivers from which the canals run, go hand in hand and the president in his letter did not fail to speak of the great work of forest preservation. He said:

Dwells on Forest Service

> By the side of the Reclamation Service there has grown up another service of not less interest and value to you of the West. This is the Forest Service, which was created when the charge of the forest reserves was transferred from the Interior Department to the Department of Agriculture. The forest policy of the administration, which the Forest Service is engaged in carrying out, is based as I have frequently said, on the vigorous purpose to make every resource of the Forest Reserves contribute in the highest degree to the permanent prosperity of the people who depend upon them. If ever the time should come when the Western forests are destroyed there will disappear with them the prosperity of the stockman, the miner, the lumberman and the railroads and most important of all, the small ranchman who cultivates his own land. I know that you are with me in the intention to preserve the timber, the water and the grass by using them fully, but wisely and conservatively.
>
> The result of first importance to you as irrigators, is this: The Forest Service has proved that forest fires can be controlled. By controlling them only one-tenth of 1 per cent of the area of forest reserves was burned over in 1905. This achievement was due both to the Forest Service and to the effective assistance of settlers and others in and near the reserves. Everything the government has ever spent upon its forest work is a small price to pay for the knowledge that the streams which make our prosperity can be and are being freed from the ever present threat of forest fire. * * *
>
> By keeping the public forests in the public hands our forest policy substitutes the good of the whole people for the profits of the privileged few. With that result none will quarrel except the men who are losing the chance of personal profit at the public expense.

Vice-President Fairbanks said in a speech at the same Congress that the farmer under the irrigation districts should learn farming in its highest form—the science of it and the chemistry of the soil. There were munificent returns for those that acquired such deeper knowledge, he said. He called attention to the fact that the great work of reclamation would be carried out without one dollar from the taxpayers. The system formed an endless chain of revenue, under which the government would be fully repaid in the end.

Stockmen not Friendly Toward Work.

In giving the government its full due for what it is accomplishing another fact of importance must be borne in mind: In most instances—in all nearly, where it is not rehabilitating or supplementing a private system—the Reclamation Service is tackling the hardest of all the feasible irrigation schemes. Private capital has been at work for a good many years developing the quickest and easiest of construction. Farmers under these have an annual charge for water. The United States is utilizing those conditions that were beyond the reach of or were deemed dangerous by capital. The cost of these is greater and the work harder. Private capital has done much to begin the work, show its vast possibilities and arouse the enthusiasm of the people.

One of the Better Homes of Settlers.

Stockmen are opposed generally to the coming of the ditch in those wilder regions, where they have held dominion for so long—that is the large growers of cattle that have been used to feeding vast ranges, mostly of land belonging to the government. Turning this land into small farms naturally deprives them of a great amount of cheap grazing territory. They naturally do not encourage the carrying out of the projects planned by the government and rather try to discourage settlers. Smaller growers of cattle and other livestock, that depend both upon that industry and farming for a livelihood, welcome irrigation, for the extended producton of forage crops is an assistance to them. There is good money in smaller herds of stock in the watered sections, where the owner has some range also.

Long for Days of open Range.

Samuel B. Robbins, project-engineer in charge of the Sun River project has some interesting things to say regarding the various conditions that are met by the Service in this big work. Referring to the attitude of the cattlemen, he says:

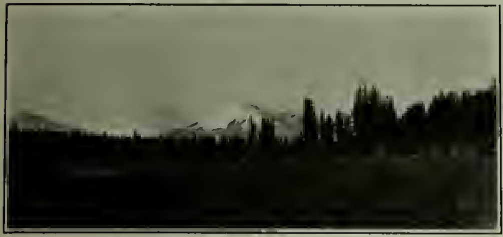
> The old-time stockman thinks of the open range, when all stock was fat and there was no beef trust—longs for that time and cannot bring himself to realize that it is gone, never to return. He made his money easily on the range—the open range without a fence. How he hates a fence, a mowing machine, and most of all a plow! But they are all here to stay. You cannot get rid of them. They are growing thicker every day. The conditions are changed but the stockman is not. He will not accommodate himself to circumstances and worst of all does not desire to do so. The new conditions mean more hard work and less land. To be sure the net returns are greater, but then he cannot make this money on a saddle horse. He makes no money on his cattle because there is no range. He makes none out of his ranch, because all he raises is hay. His acreage is large and also his taxes. He can not create a market and compel transportation facilities to come to him because he is too few. This is only too true at present. How can it be changed? Diversify and have a surplus. Raise enough sugar beets to have a factory. Raise enough potatoes and make the little ones into starch or denatured alcohol. Milk enough cows to have a creamery.
>
> "But," he says, "I cannot do it alone." True, but 300 or 500 or 1000 of you can. You can raise so much tonnage that a railroad is bound to seek it. You cannot do it alone. The Reclamation Service is trying to do it for you.
>
> The old stockman would do much better to aid instead of hinder the government work. The settlement of the adjacent lands will increase the value of his holdings, will enable him to sell his surplus acres, will bring buyers to him whom he could never expect to reach by personal effort, will bring the railroads, build up the towns, increase the taxable wealth and thereby reduce his rate of taxation.

EVERY homesteader in this country has to be a citizen or to have declared his intention to become such. This fact will bring a large proportion of native-born Americans to the new farms. The hordes of inferior Europeans that are pouring into the country through the Eastern gates that are left unguarded and congesting in cancer spots in the larger cities of the Atlantic will find little place in the reclaimed regions. The result of this will be as truly American communities on the irrigated lands as can be found in all America. These sections that a wise government is bringing under the tillers' hands will do much as they grow to preserve the integrity of our country as an American Commonwealth in face of the deluge of anarchists and paupers that is pouring in on the Atlantic side and the Asiatics that are entering the Pacific ports. The better European immigrants will be accepted as citizens and some of these will doubtless settle in the irrigated regions, but they will be desirable settlers.

It is not generally known that there is a large emigration going on from this country. We only hear of the immigrants coming in, and do not realize that a good many thousands of our best citizens are leaving for a foreign country, because better opportunity is offered them there. During the last three years there have left the Dakotas, Minnesota, Iowa, Wisconsin, and Illinois more than 100,000 farmers that have been tempted by the cheap land and grain-growing possibilities in in the Northwest Territory. The national government has noted this exodus of sturdy Americans with much concern and sees in the irrigated farms of the West the means of staying the migration, which does not seem to cease in volume. These people have money that they have made by farming in the States they are leaving. They are skilled in the tilling of the soil and are just the persons to settle the land under the irrigation projects. Efforts should be made by the communities where lands are being watered by the government to attract the attention of these farmers. There are certainly better opportunities for them in the irrigated sections—a promise of more permanent success and more comfortable existence, with the advantage of being under their own flag. This publication will reach the hands of a great many thousands of these persons and from its columns they will learn of the advantages that await them in the West, where water is making gardens that give the most with the least effort and expense.

Better than Average Town Life.

It would look as if, with the prospect of a home under the canals, free from the harder struggle for existence and the discomforts that, for people without more than an ordinary amount of money, are bound to be a feature of life in a large city, more of the urban residents of moderate means would try small farming. Whole families sometimes toil in factories or at illy-paid vocations of another sort when there is land awaiting them that only needs the concentrated efforts of such a band of willing workers to return them substantial profit. It is a mighty poor piece of soil, with water—and of a truth there is none so poor under the government projects—that will not make at least a living for several people.



Mount Shasta and Glass Lake showing a forest region.

There are fowls and vegetables, pigs and corn that can be raised from the beginning and the keeping of a milk cow is a trifling expense. Thus there is food in abundance at the inception for thrifty ones and the smallest sales of produce that are likely to be made will supply the ordinary clothing that is required for a farm existence. This is presenting the proposition in its most meager form.

It is hardly likely, that there will be many families in cities who have toiled together that will be totally without means when they decide to try the rural life. All should have saved something, and applied to land it will bring comfort. There will be no house rent to pay on the small country place and no doctors' bills from impure milk, impure air, or impure water. There will be more food eaten, but then it will not cost much.

Long for City's Hum Again.

"The only trouble with the city folk," said a man who has spent his life in irrigated sections—and his words may be read with interest by urban residents who are wondering what is the main requisite for succeeding on a farm—"is that they wont stick. They go out onto a small piece of land, full of enthusiasm, and begin swinging a hoe and pushing a spade with vigor, but pretty soon they begin to long for the hurry of the streets and the hum of the city multitude. The money doesn't come in with a rush and building on the future doesn't seem to bolster them up. Green fields and murmuring water only take the place of the city's passing show for a short time in all too many instances."

Any city person can make money on a small piece of good watered land if he will stay with it. They can farm in a short time just as well as many an older hand at the work and often they make even more money than the regulation farmer, for their city training has given them ideas concerning business and innovations that are worth something. There is nothing to discourage the greenest city person about small farming. He must buckle down to it, though, work and learn.

"I don't believe that there is anyone with a little money who will settle on a small piece of good land under a canal who will not thrive if he stays right with it and works it intelligently and faithfully. Everyone in the business will tell you, though, that work is necessary to success."

Transportation these days to any of the districts that are being irrigated will not be expensive. The railroads offer colonist rates at certain seasons that make traveling for homeseekers very cheap. A man can transport his whole family across the continent at no very great expense. Most of the regions that are to be irrigated are within easy access of railroads, important lines cutting directly through them. If there is any place among them where there are not ample railroad facilities they will come, for roads are quick to penetrate where there is promise of business. Colonists' household goods and farm implements are also shipped at moderate cost. It is to the interest of the railroads to settle up the remote regions, for it gives them freight and passengers to carry. Their co-operation will be given in all this work, it is believed.

Families Should Migrate Together.

It is not always the pleasures of the city, though, that deter people from gathering their effects and journeying to distant regions to establish new residences. It is the sentiment that surrounds home ties, the love of old association that deters many from changing their places of abode. It is hard for people to leave familiar surroundings, break away from the close friends they have been among for years and put miles between themselves and those associations endeared to their hearts.

There is a solution for this, though. Families may co-operate and journey in communities from the cities to the new lands. Three or four families, either of relatives or of close friends could take up farms together and establish themselves in the further west. There would be no breaking of the old familiar ties. The hegira would, under these circumstances, become more of a pleasure trip, the new life a pleasant one, filled with the same old friends, preserving the same old ties.

There is plenty of opportunity for the industrious members of families that cannot take up lands. Help is needed on the farms that are being established and there are good chances in the towns.

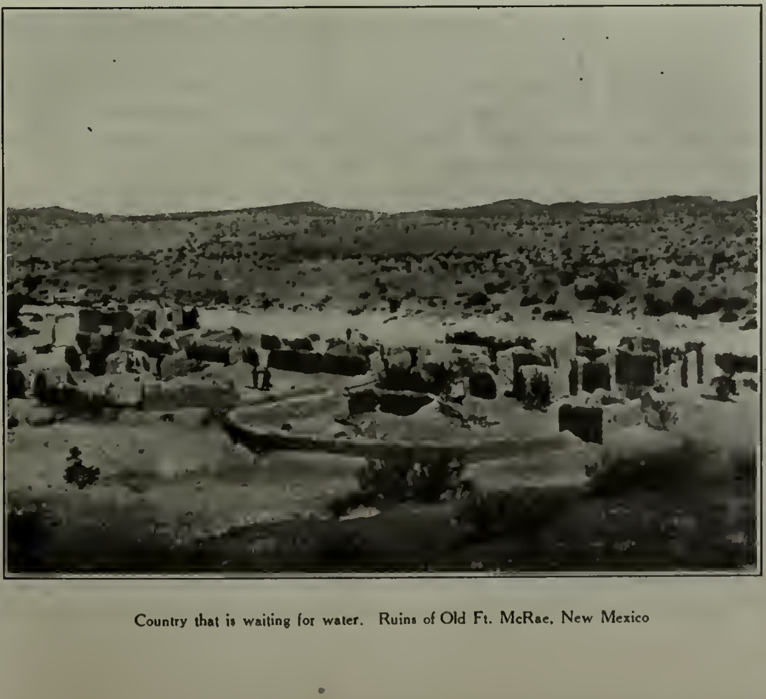
Distance Soon Grows Small.

After your first journey to the new lands, you will not think that the trip is such a long one. Then $30 or $40 will take you to most any place you have left and if you are successful at all in farming, this expenditure for a trip to your old home will not seem a heavy one. Persons that leave the cities to take up residence on the irrigated farms are not putting the world between them and their old homes by any means. Trips to the centers of population need not be infrequent, if the toil put in on the land brings the returns it should.

Irrigated lands increase in value according to the improvements made upon them. To put them under cultivation—in keeping with the requirements of the Reclamation Service will be very far from bringing them to that high state of improvement which means the heaviest and most profitable crops and gives them their greatest value. In most cases it is likely that the farm unit allowed each settler by the government will have reached such a value when he shall have received his patent and his water right that its value alone will be sufficient to put him well ahead in the world. At $100 an acre, an eighty-acre tract will give a nest egg of $8,000, not to mention the profits that the thrifty settler is presumed to take off annually, after the first two years, at the longest, and which increase every year as the alfalfa stand grows heavier and vines and fruit and nut trees come into bearing and the settler gains more knowledge of the most profitable garden crops.

Not the Place for Modish Dress.

While a care for one's personal appearance is always to be commended and is to the improvement of society when practiced generally, it is not likely that riding boots and knickerbockers will be practical or bring the best results in these regions that the government is watering for the people. Modes in clothing or polished finger nails will not count for much in that brow-dampening game of grubbing up brush, breaking, leveling and checking land and planting and taking off crops. It will be a game of brawn and energy, of tanned face and arms, of making the circle with the sun



Country that is waiting for water. Ruins of Old Ft. McRae, New Mexico and taking care that the night brings the good rest needed. All this, unless you have money already and can oversee while hired labor improves your allotment of land.

Irrigation of lands brings such a density of population that it is hard to estimate what that of the newly watered semiarid regions will be, even in a very few years. In the eastern part of the United States the densest population is in Rhode Island, where there are 276 persons to the square mile. In a certain district of Southern California, where irrigation has been practiced a number of years, there are 500 persons to the square mile, nearly all of them farming. The lands of the Nile support 1227 persons to the square mile.

The contractors do not use small appliances in tearing up earth.

The United States census shows that there were in this country in 1890 4,564,641 farms and 8,565,926 persons engaged in farming. In 1890 there were 5,739,657 farms and 10,438,219 persons engaged in farming. The value of farm property in 1890 was $16,082,267,689, and in 1900 $20,514,002,838. The products of the farms were valued in 1890 at $2,460,107,454, and in 1900 at $3,764,177,706, including mules. The population of the United States was given as 62,622,250 in 1890, and 75,693,734 in 1900. These figures, from number of farms and value to population, have increased of course during the seven years since the taking of the census.

East Takes up Irrigation.

These figures show that thirteen people are supported by every farm in the United States, figuring the farm as the basis of existence. From this some idea of this population that will be added by the cutting up of large areas into small units as under the Reclamation system, may be obtained. Estimates of additions to the country's wealth can also be made. Of course no exact average of population in the reclaimed sections can be arrived at as the dense peopling of the large cities must be reckoned with in considering the statistics given, but some general estimate can be made. It will be seen, anyway, that the newly irrigated regions are certain to add vastly to the country's wealth and population.

The East is beginning to take up the idea of irrigation. It has been pointed out that great benefits can be obtained from it in certain regions there. Farm papers are discussing the subject. Nearly every year there are sections east of the Mississippi that suffer because the rains do not come at the right time. There are big rivers there that can be utilized and ample storage sites.

Dr. Gapen, superintendent of the asylum for the insane at Kankakee, Illinois, where moisture from the clouds is deemed plentiful, saved that institution $15,000 in one year on its bill for produce by installing a pumping plant on land owned by it and employing a skilled irrigator to water the tract. The superintendent, after his experiment, said that Illinois land worth $100 an acre without irrigation would be worth $500 with it.

CONSTITUTIONALITY OF ACT

Dicta of Justice Brewer in Colorado-Kansas Case Creates Wide Interest Among Irrigationists.

The decision in what is known as the Kansas-Colorado case, recently handed down by the United States Supreme Court, and the dicta of Justice Brewer accompanying it, have created wide interest among irrigationists and especially among the officials of the Reclamation Service. The case was one dealing with the use of the waters of the Arkansas River, which rises in Colorado and flows through Kansas. Both states claimed a right to use of the waters, but Colorado got them first, to the injury of Kansas. The trouble was one of long standing and is gone into more in detail in the article on the history of reclamation legislation in another part of this publication. The Government filed a petition of intervention, declaring that neither state controlled the water.

It was feared at first that the decision cast a doubt upon the constitutionality of the Reclamation Act and curtailed the powers of the Federal Government in reclamation work. Careful study of the decision by lawyers, however, convinced them that the act's constitutionality had not been passed upon and that all the court had decided was that no state has exclusive right to control waters that enter another, and that the Federal courts will administer an equitable division of water between states.

MORRIS BIEN.
Supervising Engineer in Charge of Land and Legal Matters.

The Department of Justice has advised that the utterances of Justice Brewer in the case are entirely dicta, not necessary to the decision of the case and in no way binding. In fact his colleagues may disagree with his contentions.

The words of Justice Brewer came after the decision had been rendered and were in reply to an argument made by Solicitor-General Hoyt, representing the Reclamation Service, who had contended that the Federal Government was superior in all cases where the states had not taken jurisdiction over the water. Justice Brewer called attention to the fact that the general government has only such powers as delegated to it by the states. Raising the question of whether the reclaiming of arid lands was one of those powers, he said:

"It is enough to say that no one of them (the enumerated powers granted the Federal Government) by any implication refers to the reclamation of arid lands."

After discussing the grant of powers by implication, he concluded on that point:

"It is still true that no independent and unmentioned power passes to the National Government or can rightfully be exercised by Congress."

The conclusion of the Justice is final that "if no such power has been granted none can be exercised."

Even were the opinion of Justice Brewer to prevail, lands that had been part of the public domain, aside from state lands, would not be affected. Work that has been done by the Federal authorities by agreement with states or with private parties would not be affected, nor would work done in any of the territories. Title acquired by condemnation proceedings under the Reclamation Act would be affected, however. This property embraces in many cases the very bases of the works, reservoir and dam sites and canals.

The constitutionality of the Reclamation Act will be decided by a case that has gone up from the State of Washington, in which the act is squarely attacked. The only remedy, if it is declared invalid, is amendment of the constitution.

The decison will in no way stop the work of the Reclamation Service, which, from the advice it has received, does not think that any of its operations will be disturbed.

In an Arizona case, wherein it was contended that the Reclamation Service had no right to engage in private business and alleged that reclamation of private lands was such, the Federal court decided for the Government. Another action was brought in the District of Columbia, whereby effort was made to restrain the service from carrying on the work in Arizona. The court decided that it had no jurisdiction.

How to Make Vinegar.

When paring apples, pears or any fruit save the parings and cores and boil them in a small amount of water. When all the nourishment has been boiled out, pour the parings into a jelly bag and let them drain; then add two tablespoonfuls of sugar to every pint of liquid and set in a warm place. If after a few days it does not seem to ferment, add more sugar. Home made vinegar has the merit of at least being pure and one should not neglect to make a small amount each year. It has a flavor which improves rather than detracts from the palatability of a dish. Many people like to put a few nasturtium seeds and leaves into home made vinegar; such things seem to improve the taste of the vinegar, which serves to help give a variety.

Reclamation Attained After a Hard Struggle of Years

HISTORY OF LONG AND PERSISTENT BATTLE OF IRRIGATIONISTS THAT LED TO THE PASSAGE OF ACT OF 1902 AND REDEMPTION OF ARID LANDS OF THE WEST

THE history of irrigation in this country and the battle of the irrigationists for Federal aid in the watering of lands that finally led to the passage of the Act under which the work of today is being carried on will form one of the important pages in the chronicles of this country's advance.

Irrigation in America began with the advent of the Mormons into Utah in 1847. They were the first of the Anglo-Saxons to practice it upon the American continent. It was not an unknown art to our English ancestors, for Julius Caesar introduced it into Britain. The Mormons were a pastoral people entirely and their object in carrying water in ditches was to practice agriculture, and not for mining, which industry prompted the building of the first ditches in some of the western states, notably in California and Colorado.

The first work of the Mormons was the building of waterways to irrigate in the Salt Lake Valley, the water being taken from City Creek. It took them two years to perfect these original works, which were begun immediately upon their arrival. They made use of the ditches as they progressed. The soil in the valley they determined to irrigate was of an alkaline nature.

Despite the alkali in the soil, the first crops of the Mormons grew well. The farms were divided into twenty acres. The magnificent irrigation system of the Mormons, covering today thousands of acres of productive land, had its incipiency in this small ditch building.

The Greeley Colony in Colorado, settled in 1870, was the offspring of what was known as Fourierism, which had a wide dissemination in the forties. This was a scheme of socialism to which Francis Marie Charles Fourier devoted his life. It was brought to this country by a devotee of the philosophy and Horace Greeley indorsed it. Several colonies were planted in the East under its tenets. Mr. Greeley assisted in establishing the one in Colorado. It was here that the famous Greeley potato had its origin, fruit raising being found unprofitable at that time. The irrigation works here were estimated to cost $20,000, but before they were finished $412,000 had been expended. This was the beginning of irrigation in Colorado. The Mormon reclamation had set the example.

The success of the Greeley Colony, which was made successful only after much effort and many discouragements, had its influence on surrounding regions. Numerous irrigation settlements in Colorado, Nebraska and Wyoming were established after it. Irrigation has made of Greeley a substantial town that is an indication of what reclamation work will do for urban settlements.

Anaheim Settled in the Fifties.

California was the home of an irrigation system very soon after the Mormons had begun their canal building. In the early fifties Germans from San Francisco established the colony of Anaheim, which town they founded. They built a canal and divided the land into twenty-acre units. The colony was successful. Riverside colony followed, Judge North, a Southerner, being its originator. It was established in 1871, the original canal being finished in that year. The land was bought at the start for $2.50 an acre. Water was taken from the Santa Ana river, the source of which is in the Sierra Madre mountains. The Riverside country is today one of the most beautiful in the world and the land has an enormous value. Other important irrigation systems have made garden spots of large areas in Southern California.

Mining ditches built in Placer county in early days were also used for irrigation.

Companies in other Western states were encouraged to project irrigation enterprises, after those mentioned had become successful. When the government was finally aroused to the task of reclamation there were great areas all over the West receiving the benefit of artificial watering and many more projects were under way, or having their inception.

Irrigating of the plains had its beginning in Kansas, near Garden City, in Finney County, where one man turned the water of the Arkansas on his land from an abandoned mill race. The enormous crops he raised caused a flutter like a gold discovery and by 1890 more than 400 miles of canal had been constructed in the valley of the Arkansas river, at an expense of nearly $3,000,000.

FRANCIS G. NEWLANDS

United States Senator from Nevada, who as a Congressman fathered the Reclamation Act.

Trouble arose and disaster came to Kansas, though. The Arkansas rises in the mountains of Colorado and the people of that state claimed the right to all its water. They took it all and the Kansas canals went dry in the summer season, when the water was most needed. One English company that had established a system in Kansas lost nearly $1,000,000.

The Kansas irrigators, in this strait, began to utilize the underflow of the river, a supply that the government is developing for them today on a much larger scale than they could attempt. Hundreds of windmills were erected and these lifted water enough to again bring bountiful crops from the land.

The line that divides the semi-arid region of the West from the rest of the country, making two almost equal divisions of it, runs through the middle of North Dakota, South Dakota, Nebraska, Kansas, Indian Territory and Texas. This territory, from the line drawn, to the foothills of the Rockies and from Canada to Mexico is the semi-arid region of the Great Plains.

Beginning of the Agitation.

In the campaign for national irrigation work the name of a Californian, William E. Smythe, who has written an instructive book on the conquering of Arid America, is prominent. He was one of the leading disciples in the preaching of the cause. During 1891, while employed in an editorial capacity on the Omaha Bee, he wrote several special articles on the possibilities of irrigation in Nebraska. They were prompted by the drought that blighted Nebraska that year. The result was a series of irrigation conventions in Western Nebraska. These led to a State convention at Lincoln, which appointed Smythe Chairman of a Committee to arrange for a National Irrigation Congress—the first one held—which convened a few months later at Salt Lake City, within sight of the historic ditch—the first effort of English-speaking people to irrigate arid lands—that Brigham Young had constructed on City Creek.

Major John Wesley Powell was the pioneer worker in this great branch of home building, though. He served in the Civil War and became afterward a geographer and explorer of the arid region. His daring descent of the Colorado is a feat noted by the chroniclers. He made a report on "The Lands of the Arid Region" that became a treasured document. The Smithsonian Institution was sponsor for the preliminary work carried on by him and later he operated under the Interior Department. He became the second director of the United States Geological Survey, organized in 1879. The work prosecuted by him in this capacity laid the foundation for the splendid reclamation that is now going on. The public lands were classified and the streams measured. Scientific data concerning the arid region, including climatic conditions were obtained. This work went on for a quarter of a century and today the Service has topographical maps and figures on streams and rainfall as a result of this work that are of immense aid in the work of reclamation.

Money for Reservoir Investigation.

Congress, as early as 1887, made an appropriation for the study of certain reservoir sites. In 1889 a Senate Committee, headed by Senator Stewart, made a tour of the arid regions and held meetings which were addressed by citizens of the various sections where irrigation was desired.

Efforts to arouse general sentiment in favor of irrigation under national direction had failed, though, up to 1890. In fact there was even an opposition. Men that urged appropriations for the work were not given a hearing by the public. The dream of bringing the sage brush and cactus lands into blossom had struck no popular chord. The terrible drought on the Great Plains in that year caused an awakening, however. Even as late as 1890 the most that had seemed to be hoped was that the government would cede the arid lands to the states and territories containing them and let those states and territories proceed to develop water under laws framed by them.

The call for the first irrigation Congress, issued by Governor Thomas of Utah contained this proposition. The chief discussion was on the proposed plan of cession of the arid lands to the states. The plan was adopted. The public discussion of the scheme that followed resulted in a distrust concerning it. California newspapers opposed it because it was believed that the Western states would not deal wisely or honestly with the lands ceded. The movement was denounced in many sections. In August, 1894, an Act was passed, authorizing the Secretary of the Interior, with the approval of the President, to agree to patent to any state containing them tracts of desert lands not to exceed 1,000,000 acres in any one state, providing the state accepting such lands conveyed water to them. Some of the states took advantage of this Act, notably Idaho, which had succeeded in having water conveyed to much of the land accepted by it by private corporations. It was as provided in the act that not less than twenty acres of each 160-acre tract should be watered and cultivated within ten years by an actual settler before the patent would be granted. This measure was known as the Carey Act. It is fully described in the article on the North Platte Canal and Colonization Company's lands further on.

Second Irrigation Congress.

The Second Irrigation Congress, a very important one, was held at Los Angeles in 1893. At this the irrigation of lands by the government was advocated with enthusiasm. The tenor of opinion had changed. There were delegates from many foreign countries and some notable discussions took place. This congress appointed commissions from its own membership in the various states and territories to create favorable sentiment and prepare for some sort of a campaign to be carried on before the coming Federal Congress.

At the third Congress, held at Denver the following year, the commissions were unable to agree upon a policy, but they advocated several laws bearing on the subject of irrigation by the government, the most important being one for the creation of a national commission to devise plans for the reclamation of arid lands. Following irrigation congresses, held in various cities during the next five years, were insistent that the government take hold of the work. The crusade was fairly under way and the result, though believed to be more distant than it really was, had become certain. A report on "Reservoirs in the Arid Region," published by Captain Chittenden of the Corps of United States Engineers, in 1897, in which he advocated that the government secure full title to any reservoir site that it might wish to utilize, proved a great incentive. He suggested a workable plan and his prominence in the branch in which he was engaged gave it attention.

National Association is Formed.

At this juncture an organization was formed for the special purpose of furthering irrigation legislation. There had been up to this time no method of carrying on the work toward obtaining legislation from Congress between the sessions of the Irrigation Conventions. In 1897, the National Irrigation Association was formed at Wichita, Kansas, after the adjournment of the Trans-Mississippi Congress. George H. Maxwell, a young California lawyer, was the originator of this association. It served to bring the desired result, filling the void between the various sessions of the annual gathering of irrigation enthusiasts and bringing the importance of the cause straight home to the general public and the national legislators. Maxwell abandoned his law practice and devoted all his time to the work of this association.

It was possible now to raise a fund to carry on the missionary work. Without money to maintain literary bureaus and offices in the various cities and keep speakers on the platform to push the cause, there was little hope of early success. Funds were obtained largely from transportation companies that would be benefited by the settlement of the regions in which it was proposed to install irrigation systems. C. B. Boothe, a Los Angeles merchant, aided greatly in the work.

The Ninth Irrigation Congress, which assembled at Chicago, in 1900, came out flat-footedly on the subject of national irrigation. It adopted strong resolutions declaring for a comprehensive national system for the storage of waters and the reclamation of public lands. It demanded that water monopoly be abolished and insisted that water be made appurtenant to the land irrigated and that beneficial use be the basis, the measure and the limit of the right.

W. H. SAUNDERS
Consulting Engineer U. S. R. S.

Becomes a Political Issue.

Next arose the factor which probably did more than anything else to bring the agitation for irrigation by the government to the quick climax it reached after this. The men who were seeking political place, always with their ears to the ground, caught the unmistakable force of the movement. They felt that they must take heed of the wave of sentiment in favor of Federal reclamation. Irrigation became a thing for the political parties to take notice of and it was the subject of planks in three platforms. The Republican declaration of principles contained this during the campaign of 1900:

"In further pursuance of the constant policy of the Republican party to provide free homes on the public domain, we recommend adequate national legislation to reclaim the arid lands of the United States, reserving control of the distribution of water for irrigation to the respective states and territories."

The Democratic plank on this subject was: "We favor any intelligent system of improving the arid lands of the West, storing the waters for the purposes of irrigation and the holding of such lands for actual settlers."

The Silver Republicans had this in their platform: "We believe the national government should lend every aid, encouragement and assistance toward the reclamation of the arid lands of the United States, and to that end we are in favor of a comprehensive survey thereof and an immediate ascertainment of the water supply available for such reclamation, and we believe it to be the duty of the general government to provide for the construction of storage reservoirs and irrigation works, so that the water supply of the arid region may be utilized to the greatest possible extent in the interests of the people, while prserving all rights of the state."

Planks in Party Platform.

These platform planks of the three parties, indorsing the project of reclamation by the Federal government, meant virtually that the battle was won. All that remained was to frame a law that would be satisfactory, introduce it in Congress and fight to a successful finish there.

There had been introduced in Congress at intervals during several years preceding 1900, bills providing for the reclamation of arid lands in certain western states. They were presented by Western Senators or Congressmen, whose constituents demanded that effort be made to obtain the assistance of the Federal government in this work. The Eastern and Southern members of Congress would not support them, their ground being that appropriations for the purpose were of a local nature and that if the irrigation bills carried there should also be appropriations for drainage of swamp lands in the East and South.

President McKinley's message to the Fifty-Sixth Congress of the United States, which convened in December of 1900, contained no mention of irrigation, despite the platform of his party. On the opening day of the session, though, Representative John F. Shafroth of Colorado introduced a bill providing $13,000,000 for the reclamation of arid lands. This was to be a direct appropriation under the provisions of the measure. The East and the South arose in opposition. They could not see where they would be benefited by this appropriation. The bill failed of passage. Congressmen Newlands of Nevada and Bell of California presented measures providing for reclamation in those states, but the West would not unite on these and they had no show.

Newlands Introduces Measure.

Congressman, now Senator Newlands, on January 26, 1901, solved the problem by introducing the measure embracing the plan of applying the net proceeds from the sale of public lands in states and territories of the West to the construction of irrigation systems within their borders. This was not the bill that was finally passed, but it contained the general plan embraced in the Reclamation Act that was approved in 1902. The original measure was followed by others, by him, and from all of them the Act under which the work is being carried on was drawn.

Frederick H. Newell, later Chief Engineer and now Director of the Reclamation Service was among those who saw in this bill a complete solution of the problem giving the West what it needed without cost to the East or South.

Before the Act that was finally passed was introduced, it was approved at a conference of Senators and Representatives from the Arid states, held at the home of Senator Newlands in Washington. Senator Hansbrough of North Dakota, introduced the bill, as finally agreed upon, in the upper house, on January 30, 1901, and Newlands presented it in the lower house.

The House Committee on Irrigation approved it promptly, and the Senate Committee on Public Lands reported it favorably five days afterward. There was much debate on the bill in the lower house and a vote on it was not reached at that session. McKinley's first administration ended with this Congress.

Roosevelt had become president, through the tragic death of the beloved Ohioan, when Congress reconvened in December, 1901. In him irrigation had one of its staunchest champions. It was certain that if he could bring about Reclamation legislation, he would do so. In his first message he dealt comprehensively with the subject of irrigation of arid lands by the Federal government and urged the passage of a measure to accomplish it. He also dwelt on the necessity of forest conservation.

Work Begun With Promptness.

The Newlands bill was again introduced on the first day of the Fifty-Seventh Congress, December 2, 1901, by Newlands, in the House, and by Hansbrough in the Senate. The backing of the president's message almost made victory certain. During the final fight efforts were made to alter the measure in committee in several material respects, but only one change was made: The feature providing for the withdrawal of lands from entry under all except the Homestead law, without the benefit of the commutation clause, until the water was actually ready for delivery, was stricken out in committee.

This action had been taken solely in the interest of "land grabbers," it was declared, and there was an angry protest by friends of reclamation. There was a heated discussion at the White House over the matter and the president declared he would not sign the measure with the elimination that had been made. The provision was restored and the bill, as passed, made it impossible to obtain title to any lands to be irrigated by the government without five years' actual residence and cultivation.

Secretary of the Interior Hitchcock probably made the record for starting the machinery of any important branch of the government, when he put the reclamation wheel to turning within twenty-four hours after the bill had been signed. He turned the details of the work over to the Geological Survey within that time. Charles D. Walcott, its director, immediately organized the United States Reclamation Service, selecting Engineer Newell as its head. Mr. Walcott has since become secretary of the Smithsonian Institution.

Engineers Sent to Their Posts.

A board of consulting engineers was appointed to plan the work of the various projects. It consisted of Arthur P. Davis, Joseph Barlow Lippincott, G. Y. Wisner, H. N. Savage, J. H. Quinton, W. H. Saunders and Benjamin M. Hall. They were skilled in hydraulic engineering work. The president, in April, 1905, appointed C. E. Grunsky, formerly a member of the Isthmian Canal Commission, Consulting Engineer to the Director of the Geological Survey. Mr. Grunsky has since resigned to take up private work.

The forming of a corps of engineers to make surveys and investigations in the regions where it was proposed to establish irrigation systems was the next step. There was a good nucleus in the men already in the field for the Geological Survey, who had been measuring streams and doing other work along this line.

There are two classes of employees in this work, the information being given for the benefit of young men that may wish to enter the service. The first consists of men experienced in the construction of irrigation works, who are chosen by examination. The second consists of young men just from college, or who have learned from experience, who are given an opportunity to advance. The latter begin at $60 a month and are advanced to $75, then to $1,000 a year. They are known up to this time as "engineering aids." If they become assistant engineers, they are paid $1,200, $1,400 and $1,600 a year as they advance. When able to make plans and conduct independent work, they are eligible to become full engineer, receiving from $1,800 to $3,600 a year.

Within the first year after the approval of the Reclamation Act investigations had been made in nearly all the thirteen states and three territories mentioned in the act and the engineers had approved five projects.

Receipts From Sale of Lands.

The payment of money from the sale of arid lands into the Reclamation fund began at the close of the fiscal year, ending June 30, 1901. The receipts from this source increased largely, after the passage of the Act, and there was soon a fund large enough to justify a number of big projects. The maximum was reached in 1903. The amounts covered into the reclamation fund from the various States and territories from July 1, 1900, to June 30, 1906, were as follows:

State.	1901.	1902.	1903.	1904.	1905.	1906.
Arizona	$ 42,586.16	$ 39 187.35	$ 48,360.20	$ 63,266.02	$ 50,368.46	$ 54,559.06
California	205,030.40	298,240.36	839,221.40	482 077.16	498,488.27	239,320.01
Colorado	254,889.88	374,105.13	549,812.89	472,379.85	318,546.14	534,068.16
Idaho	206,645.36	300,803.27	650,331.95	493,697.20	383 221.74	315,175.56
Kansas	20,188.78	28,946.94	27,836.50	32,478.56	30,423.91	75 370.50
Montana	367,342.31	405,035.49	558,071.49	466,708.41	349,529.75	486,637.10
Nebraska	102,963.24	132,234.94	138,728.70	118 786.59	179,136.10	74,704.24
Nevada	9 183.47	14,230.61	14,136.76	16,210.58	11,167.70	35,843.13
New Mexico	75,203.06	72,034.60	154,265.49	86,602.58	133 243.57	202.015.97
North Dakota	449,474.96	778,021.35	1,244,916.47	1,160,386.68	807,792.48	933,012.96
Oklahoma	370,464.93	638,330.44	864,766.83	763,511.39	490,629.78	514,325.73
Oregon	364,988.62	545,972.44	1,896,970.68	1,350,651.21	610,797.39	491,069.48
South Dakota	113,274.20	194,288.17	248,696.14	249.225.28	217,688.34	279,300.55
Utah	98,416.00	48,408.38	88,872.38	48,716.82	77,662.81	114,595.02
Washington	257,180.95	536 907.82	1,109,299.54	696,271.54	451,773.36	489,958.56
Wyoming	206,989.59	178,773.24	279,709.18	325,283.92	195,045.49	326,380.47
Total	$3,144,821.91	$4,585 520.53	$8,713,996.60	$6,826 253.59	$4,805,515.39	$5,166,336.50

The net proceeds to the Reclamation fund at the end of the second fiscal year were about $16,000,000. At the end of the third year the sum was $23,000,000, and at the end of June, 1905, about $30,000,000. It is now well beyond the latter sum and the estimate is made that, with the probable sale of lands in 1908, it will reach $41,580,584.15 at the close of that year.

The Reclamation service receives valuable cooperation from the Agricultural Department; investigating the duty of water and testing soils falls to this branch. There is a Division of Irrigation Investigations and Drainage in the Bureau of Experiment Stations. Elwood Mead, as chief of this division, has furnished an immense amount of necessary data for the reclamation work.

Stock Food Value of Beet Pulp.

The feeding of sugar beet pulp to livestock has become an important factor in the production of wealth from the saccharine vegetable in those districts where it is grown extensively. It has been found that when fed with hay, the proportion being about two-thirds of pulp and one-third of hay, this food puts cattle and sheep, especially the latter, in fine condition. In some of the sugar beet sections the supply of pulp cannot meet the demand of stockmen, who have grown to know its value.

As the pulp comes from the factories it is conveyed by mechanical devices to silos or the cars. There is still a small percentage of sugar left after it has passed through the factory, which produces a fermentation. After fermentation the material is known as cured pulp and is ready for feeding.

Sheep take to the fresh or the cured pulp greedily when it is first offered them, and each will consume from ten to twelve pounds a day. At the Billings, Montana, factory, Manager Simmons directed that a band be given all it could eat the first day to ascertain the amount the sheep would consume. No detrimental results were observed and these sheep were lined up the next morning for more.

It was found that cattle ate sparingly at first. After that they ate freely of the pulp. A pen of 120 cows, bought November 1 for $21 a head and fed until February 2 on pulp and alfalfa hay, were sold on the latter date for $40 a head. These are the details of the operation in figures:

120 cows at $21	$2,520.00	
594 tons of pulp at 40c	237.60	
81 tons of hay at $6.50	526.50	
Labor and Supervision	233.20	
Total cost		$3,497.30
120 cows sold at $40		4,800.00
Netted on operation		$1,302.70

The daily ration for cattle is from 110 to 120 pounds of pulp and fourteen to eighteen pounds of hay. For sheep the usual ration is ten to twelve pounds of pulp and one to one and one-quarter pounds of hay. Old ewes will consume a little more, but there is more profit in them because they can be bought originally for less. Old feeders claim that pulp has a feeding value of from $1.75 to $3.25 a ton. It is claimed that 57 cents a head can be saved in using pulp as winter feed for sheep, beside putting them in better condition.

Pulp keeps indefinitely and many feeders prefer to use it after fermentation. Stock fed on it do not need water.

Germany uses two and one-quarter millions tons of potatoes yearly in the manufacture of alcohol and only 350,000 tons of grain for the same purpose.

ARIZONA PROJECT

Mountain Reservoir That Would Float Nation's Navy

TREMENDOUS ROOSEVELT, OR TONTO, DAM ON SALT RIVER, WILL BACK WATER TWENTY-FIVE MILES INTO GORGE AND SUBMERGE LIVELY TOWN THAT IS THERE

THE wiping out of a lively little town of 500 people that has sprung up in the valley where the great reservoir is to spread, is one of the unusual features attending the construction of the Roosevelt dam—the greatest work embraced in the Salt River project in Arizona. This reservoir will be second in size to only one other in the world—if to any at all, and that in America. The one behind the Elephant Butte dam of the Rio Grande Project is to be larger from present figuring.

1

GERONIMO'S WARRIORS TO-DAY.
They are washing out the blood of massacres by helping put water on the fields.

The backing of the water as the Roosevelt, or Tonto Basin dam grows will be the only warning the people of Roosevelt will have—if they wait for any at all—that their town is to be submerged beneath a mountain sea. Only the government cement works and the saw mill, built on the bluff 300 feet above the town, will be left of the structures that give a busy appearance to the gorge. As Roosevelt is built on lands that had been withdrawn from entry and its residents knew that the same agency that created it would destroy it, they will have no claim for damages, nor do they expect any indemnity. They will gather up the few things that are worth transporting the long way to civilization and leave their city of the gorge to the hungry waters.

This reservoir behind the Roosevelt dam will be 30 per cent larger than the famous one at Assouan in Egypt, the pride of British reclamation work. An idea of the extent of territory to be served under the project may be obtained by comparison with the irrigated region in Southern California, which contains, exclusive of the Imperial Valley, 200,000 acres. The area to be watered from the Roosevelt reservoir, with aid from a diversion dam and pumps, will be 200,000, and possibly 250,000 acres, as much and probably more than in Southern California without Imperial. As the land to be reclaimed lies in a semi-tropical climate, its possibilities of production and sustaining population may be measured in a way from results in California's Southland. In fact that portion ′of it about Phoenix, already irrigated from private ditch, is thickly settled.

Famous Road to the Reservoir.

To build the Roosevelt dam the government had first to construct a power canal and works, ordinarily quite an undertaking in itself, but in comparison with the building of the big dam looked on as merely incidental. It had also to become a manufacturer, erecting large cement works and a sawmill. An immense saving was made on cement, for which contractors asked at first in the neighborhood of $9 a barrel at the dam site, the freight being enormous.

2

Industrious Apache basket-maker, wife of one of the Apache laborers on Salt River Project.

Before machinery or supplies could be hauled to the site of the Roosevelt dam a wagon road had to be constructed a distance of sixty-two miles, forty of which were through a very rough mountain region. Some portions of it were cut around bluffs of most solid rock. It is a picturesque piece of mountain highway. The road is as much a part of the system as the reservoir itself, for it will have to be used for all time in connection with the maintenance and care of the works by the Water Users' Association, to which they will finally pass. In September, 1904, 1,517,000 pounds of freight passed over this road. Freight has been a tremendous item of expense on this project.

It was hard to find labor to construct the road and the Apaches, now tame, that once galloped behind Geronimo and burned, stole, and slaughtered and their descendants were induced to help in the work. Without the battle whoop of their old leader to give them a craving for scalps, the veterans of the border land murder fests took docilely to the collar and have been doing good work on the various parts of the project.

Water is to be provided at first for about 200,000 acres of land in the Salt River Valley in Arizona at a cost of $35 an acre, or $7,000,000 for the project up to that point. The reservoir water will be carried down in the river channel to a diversion dam above Phoenix. The land lies on both sides of of the Salt River and slopes gently to the southwest. Near Mesa and Tempe there are from 25,000 to 40,000 acres that can be irrigated by pumping. A plant to lift water, which is near the surface, from wells onto this land is being installed. It will be operated by electricity from

3

Cement Mill, Salt River Project, Arizona.

the works at Roosevelt, so the expense will be comparatively small.

Disastrous Floods Tear Out Works.

The obstacles that the wild mountain regions presented in their physical features were supplemented by disastrous floods during the earlier stages of the work at Roosevelt. There was enough to cope with ordinarily, and the rushes of water that carried massive works before them were calculated to bring discouragement, but the work went on despite the wrath of the floods and will be finished in good time. In fact some water is being utilized now for irrigation through temporary diversion dams of lesser magnitude. Stored water will probably not be furnished for two years, though some benefits will be derived from the reservoir before that time.

1 Showing Roosevelt Dam in process of construction. Foundation covers one acre of ground. 2 Roosevelt dam site. 3—J. M. Miller looking up canyon below dam site December 15, 1906. 4 Salt River Project.
Gorge on right is Contractors' Camp. Hillside Government Cement Mill Canal just below. Extreme left on hill is Engineers' Camp. 5—Carrying rock from mountain side into canyon. 6 Salt River Canyon.

The Roosevelt dam, now about ten feet above water, will be the second highest in the world, being next in height to the Shoshone dam that is under construction in Wyoming. It will cost $3,800,000. The Croton dam will be higher from bedrock to the top, but will not be as high by a great many feet above the original surface of the water.

Supervising Engineer Hill, in writing of the work on this project said: "We have built and are operating our own cement mill, we burned our own brick, made our own lime, developed and built the water power plant, sawed our own lumber, and, in fact had to do about everything one would do if he were located on a desert island and wanted to build some large works."

In Arizona, the works of the Roosevelt dam are known as the Tonto Dam and Reservoir because of their location just below the junction of Tonto Creek with Salt river. Though the dam is seventy miles from Phoenix, the lands to be watered are within a radius of twenty miles around that city. This is probably the longest distance that water is conveyed from reservoir to land under any of the projects. The road to the dam is constructed from Mesa City through magnificent mountain scenery. It cost about $100,000, $75,00 of which was contributed by Phoenix, Tempe and Mesa. It is said to be really a mountain boulevard having been given a liberal width.

Small sections of this road cost at the rate of $25,000 a mile. There are rock cuts 60 and 70 feet deep and fills of 75 feet in Fish Creek Canyon.

The total height of the Roosevelt Dam, from the lowest point of the foundation to the parapet, will be 280 feet. The foundation lying thirty feet below low water mark, the clear height of the dam will be 250 feet. The dam is 235 feet long at the river and 1080 feet at the top, including the spillways. The flood waters will be carried around the ends of the dam by the two spillways, each 200 feet in length. These will be cut in the solid rock that forms the sides of the canyon. Over each of them will be constructed a concrete bridge connecting with the top of the dam, so there will be a continuous roadway across the top.

Mighty Steel Regulating Gates.

To allow the water to flow out on its way to the canal system a 500-foot tunnel will be cut through the solid rock around one end of the dam at the height of lowest water mark in the reservoir. The flow into this tunnel will be controlled by six large steel gates set in series of three, so that they may be more conveniently operated, and repaired when necessary. These gates will be a mammoth feature. They will be the greatest ever constructed, and are to operate under the tremendous pressure of 100 pounds to the square inch. With their operating mechanism they will weigh nearly 800,000 pounds. The pressure on each will be 800,000 pounds. With the reservoir full they will be capable of discharging 10,000 cubic feet of water a second.

During the construction of the dam, this outlet tunnel will carry off the waters of the river, which have been turned into it. The silt that accumulates in the reservoir will also be sluiced out through the tunnel.

The specifications provide that the dam shall be built of "cyclopean rubble." The word cyclopean gives a good deal of expression here to the usually dry phraseology of a set of specifications. This means that huge blocks of stone, set in cement, will make up the wall that is to stay the flood. The stone blocks are being quarried from the walls on each side of the canyon and from the spillways. It may well be imagined when the great dam stands completed that the Cyclops and not mere man reared it.

The dam is being constructed on a curve having a radius of about 400 feet. It will contain about 340,000 cubic yards of masonry. The reservoir capacity will be 1,300,000 acre feet. It takes over four acre feet to properly irrigate the lands that are to be reached, but half of this is supplied by the natural flow of the river. The whole supply of the reservoir will not be used in any one year. The reservoir would hold enough water to guard against a drouth of three years, which is hardly possible, after once being filled.

It will form a lake twenty-five miles long and averaging one and one-half miles in width. The contract for constructing the dam was let to a private firm. Work is being prosecuted day and night, the glare of the electric lights, the shouts of men moving beneath it and the clang of the machinery, giving an almost diabolical effect out in this wild region. The contractor is supplied with electricity from the government plant at a greatly reduced figure. Day and night work will be the rule until the dam has reached a height of 150 feet.

Much preliminary work had been done and all seemed smooth ahead, when nature showed her wrath and turned loose her wildest floods. In the winter of 1904-5, unprecedented torrents poured down the gorge. Floods all over Arizona destroyed railroad bridges and part of the wagon road to Tonto Basin, greatly delaying the operations on the power canal and cement mill and making it impossible to operate the latter, by preventing fuel being brought in, California crude oil being used. It could not even be brought into Globe, the nearest point at that time.

Torrents Again Interpose Force.

After these floods were over the dam contractor began to build a coffer dam. The end of flood interruption had not come, though. In November, 1905, the greatest flood that the territory had known since 1891 occurred. It destroyed the coffer dam and the plant of the contractor located in the canyon. The river rose twenty-five feet in one night during this storm.

A second great flood has occurred since then, destroying the coffer dam again and shutting down the work, so far as the contractor was concerned, for five months. The United States government has by force account gone ahead itself with the construction of the power dam on Tonto creek about twenty miles above the Roosevelt structure and has underway the diversion dam forty miles below.

At the start only 1,300 electrical horsepower was developed from the power canal. This was used in running the cement mill, ice plant, 1700-foot aerial tramway for transporting cement, machinery for lifting the stone blocks into place and other work. It is expected that when the project is completed the permanent power plant at the dam and other power-developing units along the canal will supply from 15,000 to 20,000 horsepower. Part of this will be conveyed eighty miles to pump for the lands of the Indians on the Sacaton Reservation. What is not used for pumping will be sold for commercial purposes. As power is high in the territory, the government may derive a large revenue from this. It will go into the project construction fund.

The permanent power plant is being constructed near the foot of the dam. It will contain hydraulic and electrical machinery to utilize both the energy from the power canal and the water in the reservoir which is to be drawn down to the eighty-foot level through pipes connecting with water wheels. A large part of the power when conveyed to the valley, will drive centrifugal pumps. Each horsepower will be sufficient to pump water for nearly ten acres in the valley, sixty miles away. The power canal is nineteen miles long, and has a capacity of 200 second feet. It runs around the side of the bluff to a point beyond the reservoir at an elevation on the canyon side above the dam and the water is discharged through turbine wheels under an available head of 220 feet, developing 4400 horsepower. The driving of 9000 feet of tunnel was necessary in its construction.

Manufacturers criticized the action of the government in making its own cement for the purpose of constructing the Roosevelt dam, but it was necessary that the cost be kept down in order to render the project feasible at all. After prices of $9 a barrel had been quoted informally, some manufacturers said they could supply the cement cheaply enough, but the lowest bid received then was $4.98 a barrel, the freight being very high. The geological survey had discovered a fine ledge of limestone just above the dam site. The government decided to erect the mill there. It was built at a cost of $218,380.57. Its capacity is about 350 barrels a day and the lowest cost has been $1.92 a barrel and the highest $2.10. There will be 240,000 barrels used in the dam.

Cement for Other Work Too.

Cement from this mill will probably be hauled to the diversion dam near Phoenix, where 40,000 to 60,000 barrels of this material will be used. It has been shown that it is cheaper to haul the cement fifty miles to this dam as back freight than to purchase in open market and haul it twelve miles from Mesa.

The saw mill has been a very important adjunct to this project. Its operation necessitated the building of about twenty-eight miles of road in the Sierra Ancha country. The timber resembles the common Oregon pine and the logs have been hauled by team to the mill at Roosevelt. There have been sawed by the government about 3,000,000 board feet of lumber, and about 3000 poles and piles of from 25 to 40 feet in length have been cut for use on the telephone and other electric lines and for temporary structures at the big dam. A large part of the lumber has been used in timbering tunnels on the power canal, for concrete forms and for buildings, bridges, repairs, etc. Very little has been brought in from the outside. A great saving has been made by this mill and there has been a special advantage in being able to cut unusual and special bills of lumber on short notice. There is a large supply on hand now at the mill. The first million feet were sawed by contractors using the government mill. The result was very unsatisfactory. After the government took charge the rate of output was doubled and the machinery was taken better care of.

After the washing out during the floods of 1905 of the Arizona dam, the principal diversion weir for the canals on the north side of Salt River, which caused great loss to the farmers, the government entered into negotiations and made purchases by which it now controls practically all the canal systems on the north side of the river.

Diversion Weir Above Phoenix.

The government is now building by force account a big diversion weir on Salt river at Granite Reef, just below the mouth of the Verde, to provide water for these lands on the north side of the river and also some on the south side. This weir will be of concrete. It will be more than 1,200 feet long and will raise the waters of the combined Salt and Verde rivers about twenty feet. Work was commenced in July, 1906, and is nearing the finish. This weir will be of greater immediate importance to the Salt River Valley than the Roosevelt dam, as there will be no storage water ready for about two years. When the dam shall divert the water used on both sides of the river, it will save the heavy maintenance charge of the six temporary structures now used. There are about 100,000 acres under irrigation in the valley now, under works that the government will take over in the main and add to the one big system. This diversion weir is about twenty-eight miles from Phoenix.

The irrigable lands under the project are worth from $50 to $500 an acre, according to location and improvements. The soil is sandy loam and in some places, clay. The altitude is from 1,000 to 1,300 feet. The principal crops are semi-tropical fruits, cereals and alfalfa. There is no public land under this project.

There is pending in the territorial supreme court of Arizona an action for the determination of all rights to the use of the waters of the Salt River and its tributaries. The adjustment of these rights will enable the government to give a very advantageous distribution of water from the canal system on the north side of the river. It will enable all who are entitled to water to obtain the full amount due them with much less friction than has existed and will result in a considerable saving of water because of the comprehensive system the government can establish.

The terrific heat at Roosevelt has caused the prostration of some members of the office force employed by the government, but men employed outside have not suffered. The sanitary arrangements are excellent and there is little sickness. There was some typhoid at the beginning of the work. As there was no potable water at the dam—the river contains salt, but not enough to injure crops—a supply was piped three miles from Cottonwood Canyon Springs to two reservoirs of 40,000 and 20,000 gallons respectively.

The first allotment made for this project was $3,500,000.

The Salt River Project lies in Maricopa county, and Phoenix, capital of Arizona and seat of government of that county, is the largest city in it. Phoenix has about 15,000 population.

CALIFORNIA and ARIZONA PROJECT

Colorado Waters to Form New Egypt on Arizona Border

YUMA PROJECT WILL REDEEM RIVER-MADE AND DESERT LANDS ABOUT MODERN ALEXANDRIA THAT WILL YIELD RICH PRODUCTS OF SYRIA AND ARABIA

WHERE the American Nile flows through the region of this continent's ancient civilization lies the city of Yuma, in Arizona, if not an Alexandria, certainly an incipient metropolis that is to be the center of culture and commercial industry in a region even fairer than that Egyptian ribbon of green, repainted each summer by the mighty river of the Ptolemies. Modern engineery, though, is going to do more with the Colorado than the Egyptians did with the Nile. On the rich table land around this Arizona city the waters of the great river—whose flow is sufficient to turn into bloom millions more acres than it can ever be made to lave—will be led, and besides the lowlands that are naturally watered each year by the flood, miles of mesa soil, as rich as any in the world, will be turned into bearing. Under such a climate, this watered land will produce the golden crops of earth and the breath of the Euphrates, of Corsica and of Sicily will be borne from the orchards of orange and lemon, of date and citron.

The government of the United States has one of its leading irrigation enterprises under way near Yuma. This is known as the Laguna project. The problem of conquering the turbulent broncho of rivers has finally been solved after long and patient experiment and investigation by the experts in the employ of the government and that which at one time was looked upon with despair as a task almost beyond human grasp will be carried out. There will be created a wide region of eternal bloom, its main gem a city, overlooking a majestic river, that will vie with the wonder places of earth and toward which the feet of the world's tourists will be turned when it shall have attained the glories that are expected of it following the completion of this government's undertaking.

Big Weir in Colorado. 62 Per Cent Finished.

With $3,000,000 set aside by the Secretary of the Interior, in accordance with the provisions of the national Reclamation Act, the work of constructing the Laguna dam that is to make the irrigation of the Yuma lands possible is well under way, and while the task will not be completed as early as expected, owing to the unusual difficulties encountered, it will not be a great while now before the water is upon the land. The dam was 62 per cent completed in June last. The surveys of the Colorado and Gila rivers, necessary in carrying out this project, were made in 1893-4. The Yuma County Water User's Association was formed to assist and has given effective aid in furthering the project. This is an association of those who are to use the water and acquire the lands.

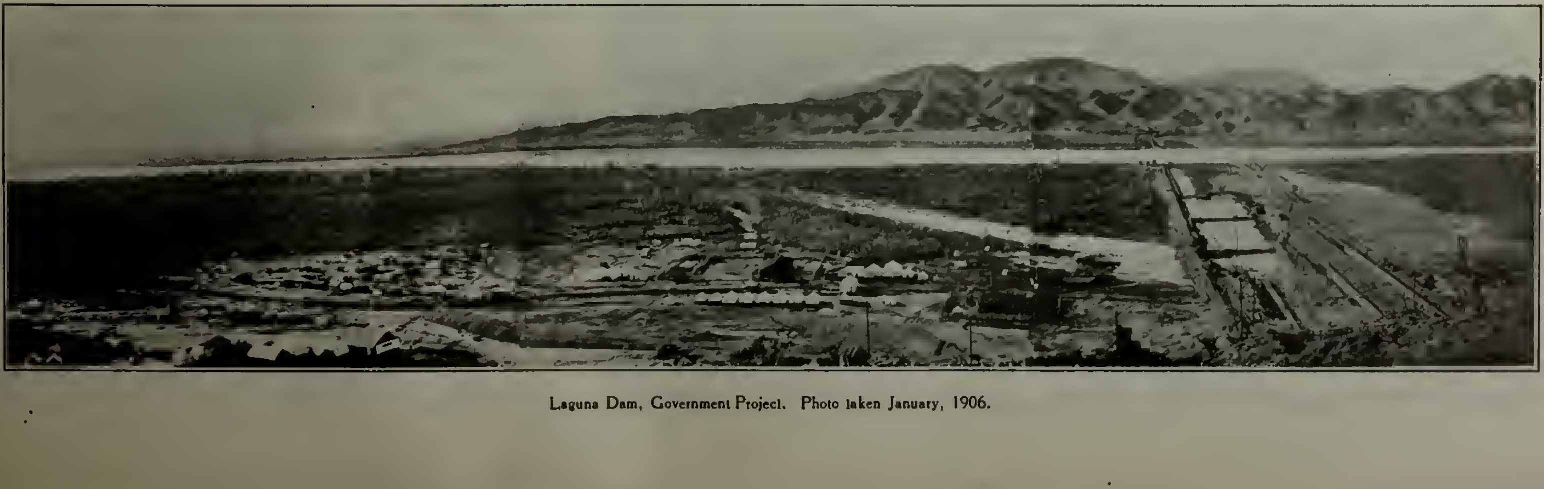
Briefly stated the engineers solved the Yuma project by deciding upon a weir dam that would permit the greater part of the silt that makes the waters of the Colorado an unsweetened molasses to pass off at the bottom, while the partly clarified top of the stream might flow away in the canals. The first search of the engineers was for a dam site and in this they made tests and a discovery that will be a lasting advertisement for the permanency of the soils that the water is to be taken upon. For centuries, the Colorado, like the Nile has been carrying the rich sediment and building up lands further down. The engineers set their faith upon a long basin at the edge of the hills just above Yuma. It appeared to be a beautiful reservoir site. When ready to explore it, they sent the drills down to find bedrock. At 900 feet the limit of the drills had been reached and they were still in silt and sand. There was no possibility of a dam on bedrock there, but it was possible to construct the weir decided upon and the bottomless reservoir site became a settling basin. The great spread of the dam, with its tremendous weight will keep it in place and it will raise the water a height of six feet, sufficient to carry it off in the canals. There is a ten-mile lake in the natural basin, where the onward rush of the river is checked and the pause given the water causes a settling of the sediment which is sucked on through the flat opening underneath..

Dam Bound With Steel and Concrete.

The description of the weir as given by the department shows it to be one of the triumphs of modern irrigation engineering. It consists of a loose rock structure with paving stones one and one-half feet in thickness on the down stream slope, the structure being tied together with three parallel walls of steel and concrete run longitudinally between the granite abutments on the sides of the river and the entire structure being made further secure by an apron of loose rock, pitching 10 feet in thickness and 50 feet in width at the lower toe of the dam below the sloping pavement. The height of this weir is to be 10 feet above low water and the slope of the down stream side is 12 feet horizontal to 1 foot vertical, with the 50-foot apron below.

The design provides that the upper core wall of concrete is to rest upon a row of sheet piling driven into the bed of the river.

The handling of the silt of the Colorado is one of the most difficult features of this undertaking. It is known that its amount is very large. The river is on a grade of approximately one foot to the mile above the Laguna weir site, so that this weir 10 feet high will make a settling basin of relatively quiet water approximately ten miles in length



Laguna Dam, Government Project. Photo taken January, 1906.

View of Yuma on the banks of the Colorado.

above it. At each end of the weir, and constructed in solid granite rock, will be a sluiceway 200 feet wide and excavated to the depth of low water in the river. These sluiceways will be closed by large gates operated by hydraulic machinery. The diversion canals will take their water above these gates from the sides of the sluiceways. The area of these sluiceways being so great, the water movement toward the canal will be slow, and most of the sediment will be deposited before reaching the canal intake. When this has accumulated to a considerable extent, the sluice gates will be opened, and it is estimated that their capacity will be approximately 20,000 cubic feet per second each. This great volume of water passing through the sluiceways, when the gates are opened, will carry out with it the sediment deposited above the intake of the canal. The ordinary low stage flow of the Colorado river is from 3500 to 4000 cubic feet per second, so the capacity of each of these sluiceways will be about five times the low water flow of the river.

Plans to Get Rid of the Silt.

As a result of a number of experiments, it has been found that the principal quantity of silt is carried along near the bottom of the river, and that the surface water is relatively free from sediment. It is planned, therefore, to take the water into the canals by a skimming process over a long row of flashboards, so that the entire capacity of the canal can be furnished by drawing but one foot in depth of water from the surface of the river. As a still further precaution it is proposed to construct the first 3000 feet of canal on each side of the river of such size that the movement of water through it will be slower than one foot per second. These settling basins, as they are called, would be either excavated from granite, or where the section is in earth end, they would be paved. At the lower of these settling basins, gates will be arranged to discharge into the river, so that the water can be drawn down to the level of the stream, and a grade of 11 feet in 3000 feet thus obtained. At the lower end of these settling basins the canals proper will begin. The silt that will enter the settling basins in spite of the two precautions noted, will be permitted to settle in these basins, and at such intervals of time as may be necessary the sluice gates at the end of the settling basin will be opened and sufficient water drawn into this section from the headworks to scour it out. Every portion of this weir and headworks as designed would be of rock, concrete or steel, with the exception of the sheet piling, which will be driven entirely below the water level, and so will not decay.

Every portion of the weir will be of what is known as permanent construction. This character of work will, of course, be expensive, but it has been proved to be sound economy to build in this way.

The reports of the Department of Agriculture on the character of the soils of this valley, as well as past farming experience, indicate that they are exceedingly fertile. The silt of the Colorado River, all of which can not be removed at the headworks, has high fertilizing properties. Under these conditions, and with proper handling of the system, the valley should be perpetually fertile. The entire cost of this enterprise, providing all the area is irrigated which is indicated above, will amount according to the estimate, to about $35 per acre irrigated. It is entirely possible, however, that as the construction work proceeds this cost may be somewhat increased or lessened, although an effort has been made to cover all contingencies, and the estimates of cost have been liberal. The price will range near $35 per acre, this to be paid over according to the provisions of the Reclamation Act and regulations of the Secretary of the Interior in ten annual installments after the first delivery of water. The annual charge for maintenance and supervision of this system will be very low and probably materially less than $1 per acre. There will be no charge for interest, profit or taxes.

In the Yuma Indian Reservation on the California side of the river it is estimated that there will be within the levees 16,000 acres, and on the Arizona side 91,000 acres under the system, making a total of 107,000 acres. Of this acreage it is estimated that 20,300 acres can not be irrigated to advantage thus leaving 86,700 acres of irrigable land, of which 73,100 acres are in Arizona.

The capacity of these canals at their intakes will be 1200 cubic feet per second on the Arizona side and 200 cubic feet per second on the California side. The amount of silt that would be delivered daily into the Arizona canal, if diversions were not made directly from the stream, would approximate 17,000 cubic yards of wet mud by volume. It is not believed to be possible for a canal to continuously operate successfully for the irrigation of lands along the valleys of the Colorado river, unless some very substantial arrangements are made at the headworks for the handling of silt, and this is believed to be a justification for the expenditure proposed for these headworks; also the water must be held to a fixed level at the canal heading for all stages of the river. This structure will cost approximately $1,000,000.

Crossing of Gila is Difficult Problem.

Careful study has been made of the existing canals in the vicinity of Yuma and Imperial to determine the shape that they naturally assume and the roughness of the bottom and sides, which tends to retard the velocity. Based upon this data, the canals have been designed so that they will carry water at a higher velocity throughout than will be found in the settling basins above their heads, and of such velocity as will permit of a minimum loss by seepage and evaporation. The gates and drops of these canals and the Yuma bridges are designed as steel concrete structures. A distribution system has been estimated upon to furnish water to each 160-acre tract.

There will be small areas of land in the upper Gila Valley and below Yuma that will have to be served by pumping plants that will lift the water from five to seven feet. The energy for this will be supplied from a water power plant to be constructed above Yuma at a drop in the main canal. This power plant will be used in connection with the drainage system also.

One of the most difficult problems in connection with this project is the crossing of the Gila River. The necessity of making this perfectly safe has caused the designing of a structure that will cross beneath the bed of the river, the top to be several feet below the lowest point of the stream bed. This structure will be of steel and concrete and about 3300 feet in length.

Because of the tremendous annual rise of the Colorado River, a large portion of the lands along it are subject to overflow, which practically prevents residence upon them and also the farming of them without protective works. Leveeing, therefore is deemed an essential feature of the reclamation enterprise. The shape of the levee adopted is one that has been developed and proven successful by years of experience along the Mississippi. These earthworks will have a slope of three feet horizontal, for one foot vertical on the water side, and two and one-half feet horizontal to one foot vertical on the land side; they will be eight feet wide on top and their height will be five feet above the highest point reached by the floods of 1903. The levees on each side of the Colorado will be 4000 feet apart, giving plenty of room for the monster

View of Yuma on the banks of the Colorado.

to shake its flanks when it is swelled to bursting size by the melting snows, and on the Gila they will be 3200 feet apart, hemming in that turbulent stream so it can not stray far in its hunger for crops and homes. The government will not only give the farmer water, but it will protect him from water.

Land Doesn't Need Any More Fertilizing.

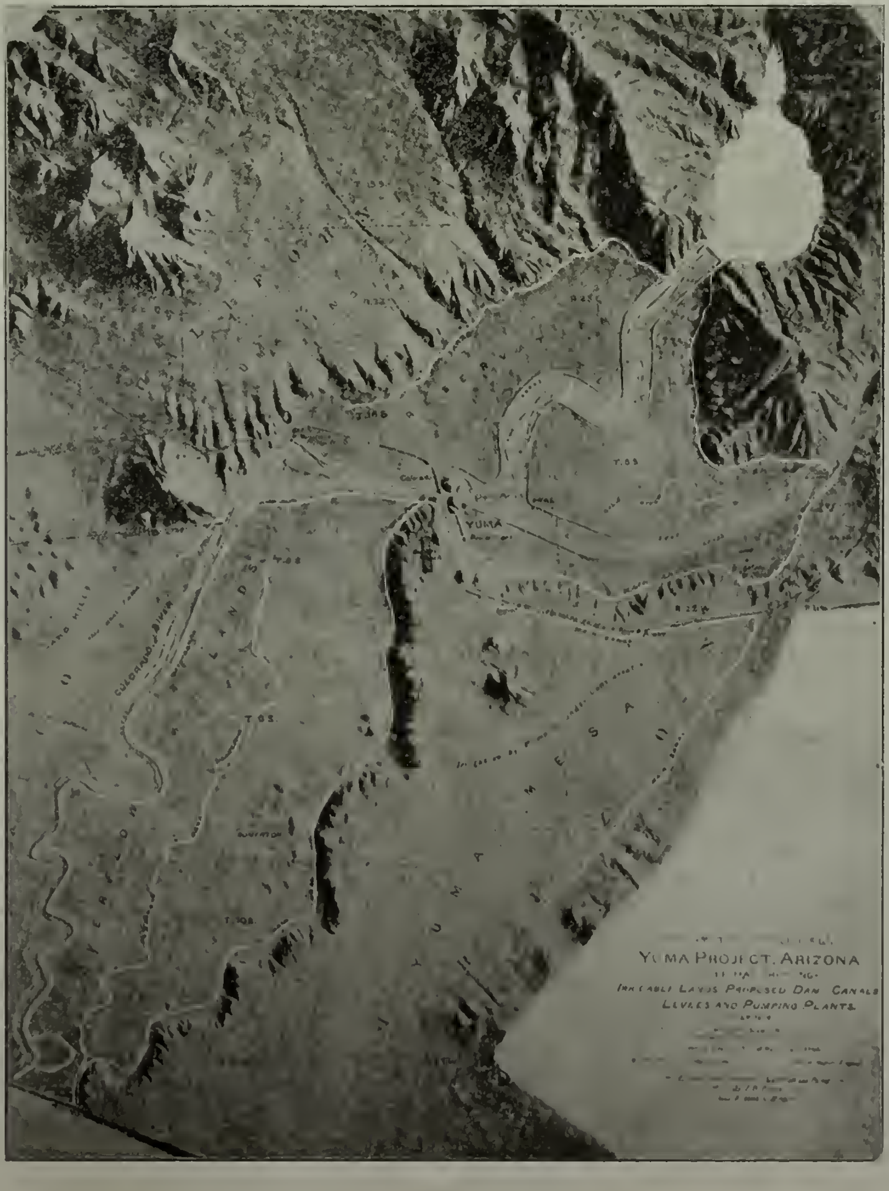
One of the strange conditions existing about Yuma is that one of the necessary things to be done in bringing the land under cultivation, is to keep the fertilizer off it. This sounds like the Barnumized imagining of a promotion press agent, but it is no joke. There is too much of the rich silt brought down by the river. The land is already rich enough. The problem is to prevent further sediment being brought upon it. The silt borne down this river has been measured and analyzed for some years by the Agricultural Experiment Station of the University of Arizona and for the last three years by the Government Reclamation Service. The figures from the two sources show that 90,000,000 tons, dry weight, are carried down each year. It contains large amounts of potash, phosphoric acid and nitrogen. The value of the nitrogen alone, at the price paid for it by commercial fertilizing work would be $1.25 per acre foot of water, or $5 per four-acre feet, the amount used yearly in irrigating an average crop. The problem of disposing of the mud which contains all this food that plant life in many other regions is languishing for is the rock on which the several private companies that have tried to take water from the Colorado have been wrecked. The United States alone, taking the whole squirming, resisting river over its knee, has been able to subdue it and bring it into control. How the government gets rid of the mud has already been told.

The four factors that the government is dealing with in its contest with the surly Colorado are to put the water on the land, to keep the flood water off it, to drain such portions of the low-lands as may become waterlogged by seepage and to dispose of the mud that the river persists in depositing on the land, like a dog continually bringing back a bone that has been thrown away.

In comparison with the fourth the other problems are insignificant. Intelligently constructed works at the start and eternal vigilance afterward will win against the silt deposits, however, and farmers will be saved the expense of fertilizing for certain crops and especially for citrus fruits that must be fed by artificial process elsewhere. The cost of restraining the waters is great as shown by the enormous levees that are being constructed. Portions of these levees, while constructed, as already stated, to cope with a flood such as that of 1901, have already been tested by that of 1905, four and one-half feet higher than the first mentioned rise. It looks as if the danger from flood had been eliminated.

Work Will Be Finished at Early Date.

Sometimes when private corporations undertake a mighty work like that of utilizing the waters of the Colorado for irrigation, cities and communities that depend upon the completion of those enterprises for their advancement never know until the work is finally completed whether it is ever going


YUMA
COLORADO RIVER
YUMA PROJECT, ARIZONA
IRRIGABLE LANDS PROPOSED DAM CANALS
LEVEES AND PUMPING PLANTS

to be, for there are so many great obstacles to contend with that sometimes private capital fails and there is always a contingency to make the future uncertain. When the government takes hold of such a project as this, however, all contingencies are swept aside and there is a certainty that time alone is needed to bring the fulfillment of expectations. At Yuma this time will be reduced to the minimum for not a second is being lost. Maybe the waters will be utilized next year. By the full light of the sun and by electric light at night, generated from power already developed, the laborers are at work incessantly and Yuma has an assurance on which to erect her iridescent castles. She will not have to grow impatient waiting for the fulfillment.

An article from the pen of the Arizona Republican editor, showing how rapidly work is going on upon the Laguna project and what development that city and the country surrounding it expect from its completion is appropriate here. This journalist says in his publication:

Baseball Grounds, Yuma.

"That Yuma has more than mere hope on which to base dreams of a great future is shown by the fact that hundreds of men, driven even by night under the electric lights, are toiling upon the construction of a Government dam across the Colorado, twelve miles above this city. Officially it is the Laguna dam. A part of its construction is charged against the California side of the river, where, at the start, it will irrigate about 15,000 acres, largely to the benefit of the Yuma Indian tribe. If the government ever takes over the Imperial project, on the lower border of California, it is possible that one of the largest canals ever known will lead away from the California end of the dam. But as far as now known, the main attribute of the structure will be the diversion of water for the irrigation of 73,100 acres lying around Yuma, Arizona. These lands will be called upon to repay the government their part of the cost of construction, but their value will be so much increased that the burden is expected to be a light one—less than $40 an acre. * * *

"Besides the land to be irrigated by this canal in the vicinity of Yuma there are about 90,000 acres that can be brought under cultivation by raising water from the river. It is proposed to irrigate 25,000 acres of these lands by raising water from the main canal on the Arizona side, power being furnished by electrical energy generated at or near the dam.

"Already irrigating a small expanse of land back of Yuma and down the river are several canals, locally controlled, that will probably be acquired by the land owners under the terms of the irrigation act. One of these canals secures its water through the lift from the Colorado at Yuma. Up the river, within the county, are a number of farming communities with small irrigation systems. One of the earliest water storage projects known was commenced on the Gila years ago, but went to pieces before actual construction was begun. It is a curious fact that few private irrigation enterprises have ever been successful. The South Gila project is now being revived."

Leveeing Important Part of Work.

One of the peculiarities of the Colorado is that from the Yuma region to the sea the deposits of silt have built up its bed so that for that stretch of its roiled length it runs on a sort of a natural aqueduct, high above the surrounding country. When the floods come it rolls out of the groove at the top of this bridge and for this reason the levees have been necessary to keep it is bounds, but this elevation gives a natural method of using its waters here without a reservoir to store and raise them.

3
Date palm with fruit, Madison Ave., Yuma.

When the news reached Yuma that the surveys and estimates for the Laguna project had been approved at Washington, and the sum of $3,000,000 had been set aside by the Secretary of the Interior for the carrying out of the great work a wave of joy swept over the people and hopes for the future ran high. The dream of years was on the way to realization.

The bids were in due time advertised and opened, first for the construction of the great Laguna dam, to J. G. White & Company, of New York, and later for the building of a section of the levee on the Colorado River, to Miller & Peasley, of Los Angeles. The latter firm has completed its contract, and has a sub-contract with J. G. White & Company, at the Laguna dam site. The work is progressing rapidly and steadily, and will probably be completed before another flood season. Bids for construction of other sections of the levee have been advertised for and contracts let to Yuma Valley farmers, who will in this way receive a double benefit. Before many months the entire valley to the line of Old Mexico will be under the protection of levees, and the possibility of disastrous floods will be ended forever.

The regulations under which the water is to be supplied to the users after the completion of the works is one of vital importance to the intending settler in this new Eden of the Southwest. From material supplied by P. J. Miller, secretary of the Yuma County Water Users' Association, the entire information can here be given. This body is an association incorporated under the laws of Arizona, claiming the right to the use of water and owning lands within the area to be supplied by the works of the government. It was formed to assure the government that the land owners would apply for water from the irrigation works and that they would so adjust the existing claims to the use of it that the administration of all the water available for the lands under the project, whether supplied from private or from government irrigation works would be under one control—that of the water users themselves. This organization is necessary that there may be supervision over the distribution to lands in private ownership as contemplated by Section 6 of the Reclamation Act.

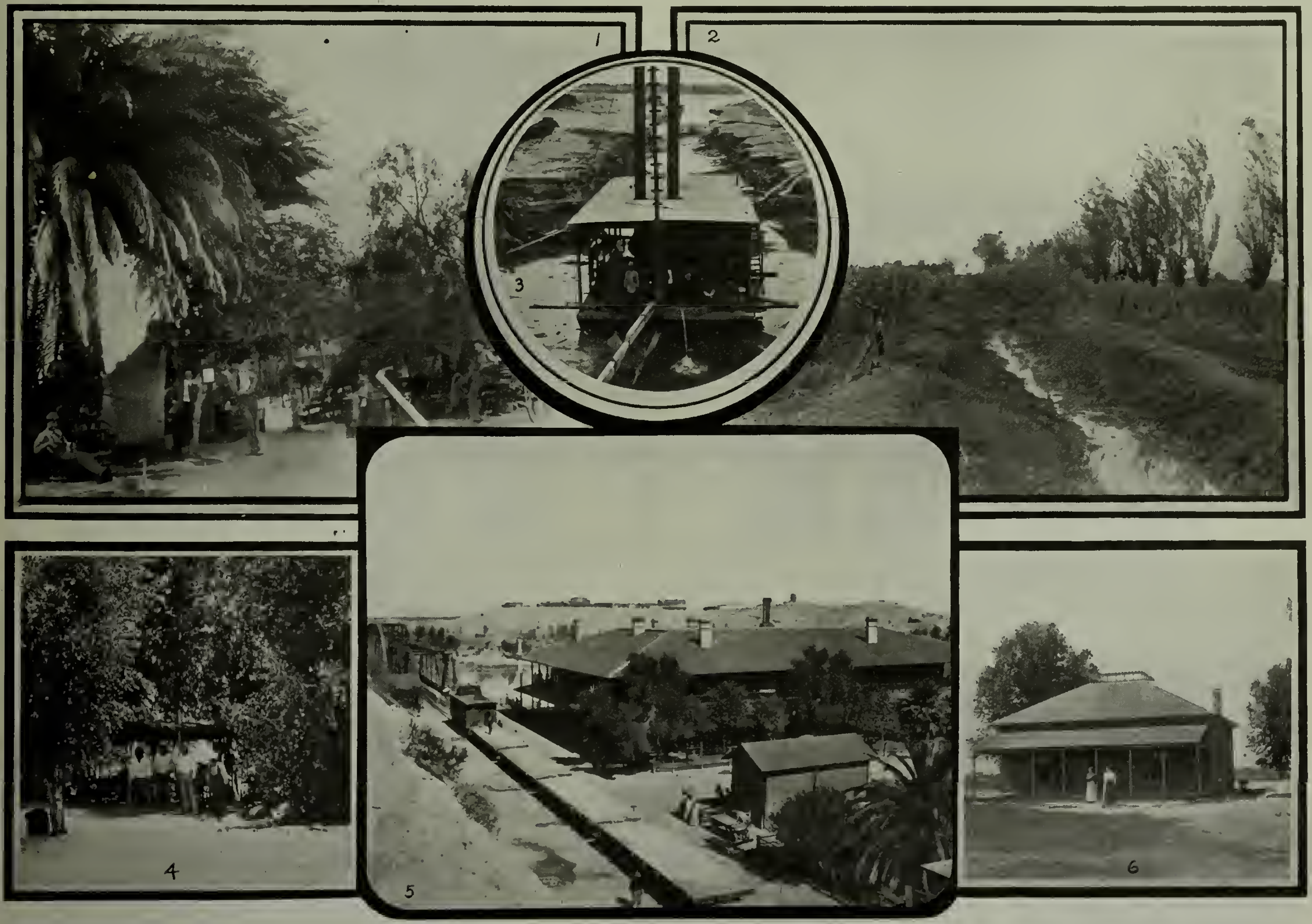
Rules of the Water Users' Association.

Persons joining this Association are required (1) to agree to turn over to the management of the Association the water they have heretofore appropriated, to be administered in connection with the additional water supply furnished from the government irrigation system. (2) They agree to make their former water rights as well as the government water rights appurtenant to the lands irrigated. (3) They agree to pay the charges for the water rights required by the Reclamation Act. (4) They agree that their land shall be security for the government charge for water and that such charge shall be a lien on the land, which the Association may enforce, if they do not pay for the water. (5) They agree to dispose of the land they own in excess of the limit of land in private ownership permitted to apply for water from the government system.

Famous Agua Caliente Springs, near Yuma, Arizona.

The Association is governed directly by the water users themselves and through the officers elected by them. It will have the administering and distribution of all the water furnished by the government system. Each member will receive his proportional part of the entire supply in the hands of the Association, not in excess of the amount necessary for the proper cultivation of his land, as beneficial use only shall be the basis, the measure and the limit of the water right.

The Association in its contract with the Secretary of the Interior has bound itself and agrees to guarantee the payment for the government construction and will enforce collection from its shareholders, by means of the lien on their lands, if necessary. Each shareholder derives a benefit from this lien, as it protects him against the possibility of being required to pay for a shiftless neighbor's water right, for without the lien the Association would be required to assess each member for any deficiency. The total cost of the water right will amount, according to the estimate, to about $35 per acre irrigated. It is entirely possible, however, that as the construction work proceeds this cost may be somewhat increased or lessened, although an effort has been made to cover all contingencies. The price will range near $35 per acre, this to be paid for according to the provisions of the Reclamation Act and regulations of the Secretary of the Interior, in ten annual installments after the first delivery of water, or, what is still more likely, after the harvesting of the first year's crops.



1—Date palm 23 years old, Yuma. 2—Cornfield and irrigating ditch six miles west of Yuma. 3—Irrigation, Land and Improvement Company dredge at work in canal. 4—Irrigation, Land and Improvement Company camp at "Heading." 5—Southern Pacific Hotel at Yuma. Fort Yuma in the distance. 6—Farm in Colorado Valley, seven miles below Yuma.

The annual charge for maintenance and supervision of this canal system will be very low and probably materially less than $1 per acre. There will be no charge for interest, profit, or taxes. Any land owner within the Yuma project who desires to acquire a water right must become a member of this Association and subscribe to all the requirements of membership, and afterwards make application to the government for a water right, when it is ready to receive such.

Date Palm of Syria Grows at Yuma.

The faith of the Yuma people is beginning to be centered largely in the date. While abundant wealth may be obtained from almost all other products, the people there have come to believe that in this Syria of the new world the cultivation of the fruit that succored the Israelites at Elim lies the greatest promise of the future; also the Yuma people have learned that the crops that have been successfully grown on the Nile for centuries will thrive equally well in their region and so they will take advantage of the experience of ancient Egypt that through the cycles of the years has unlocked the secret of plant life. Active steps have been taken by the Department of Agriculture to introduce these Egyptian crops. Some that have been experimented with already have given gratifying results. The shade of Cleopatra may in future years swing its palm fan in the blooming vistas of Yuma county, feeling that it has found a place that even surpasses the venerable cradle of mankind, sweetened by the lotus and the pomegranate.

"El datil es el arbol de porvenir"—"The date is the tree of the future"—is the saying of the Mexicans. The date palm is generally conceded to be the crop which, by long cultivation in a similar region in Africa, has become peculiarly adapted to the soils and climate of such an area as the Yuma Valley. Date palms will thrive in soil having as much as 3 per cent of alkali. Experiments are now being carried on in the Salt River Valley to test the Algerian date palms in Arizona, and the present season some experiments will be made with Egyptian cotton in the Colorado delta. Other crops from parts of the globe with a similar climate will be tried until a new agriculture, consisting of crops which it is impossible to grow in the colder parts of the United States, is developed. Such an industry should yield to the farmers a revenue far greater than that now derived from the almost exclusive growing of alfalfa and the raising of stock. These latter industries will, however, bring the first quick wealth and then the grower can start upon those crops, which while slower of return, will be better than mines of gold when they come into bearing.

The date palm has been cultivated in Yuma for more than forty years and some of the trees have borne for nearly twenty years. Lean, sandy soils of the desert, with a small percentage of clay and charged with alkaline salts, are the best for date culture. Arizona seedlings seven years old produce upwards of 200 pounds of fruit. Many varieties from Spain, Persia, Arabia and other date centers of the Old World are being grown experimentally by the University of Arizona. The United States Government is co-operating with the territory in a series of experiments. An orchard has been planted. It is believed that the results of demonstrating early commercial varieties by this will have a noteworthy influence in the settling of several million acres of Colorado flood, plain and delta lands that are similar to that bearing the experimental orchard.

Production Figures Show Rich Land.

This statement of one year's products of the Yuma Heights' fruit farm, furnished by W. A. Cheney, its superintendent, will give the farmer looking toward the Yuma Valley an idea of its productiveness:

Grape fruit, 300 boxes per acre.

1

4

1 S. P. Bridge over the Colorado River. 4—Ranch three and one-half miles west of Yuma.

Grapes (twenty pound crates), 4000 crates per acre.

Lemons, 400 boxes per acre.

Oranges, 300 boxes per acre.

Apricots, 4000 boxes per acre.

Cantaloupes (sixty to crate), 100 crates pei acre.

Cucumbers, 500 dozen per acre.

Tomatoes, 6000 per acre.

Watermelons, 1000 per acre.

Squash, 8000 per acre.

There are plenty of testimonials to the productiveness of this region. Fruit grows to perfection. Judge Thacker, from two acres of Bartlett pears, eight years old, received in 1903, $550; in 1904, $801; in 1905, $645, besides using all he wanted for preserving. From ten acres of grapes he received an average of $32 worth per acre. His barley thrashed twenty-seven and one-half *sacks* per acre and his alfalfa produced ten tons to the acre.

The introduction of the famous pistachio nut, used by the Arabs, Persians and Turks in stuffing fowls and other meats, is regarded as approaching the importance of the planting of the date in Arizona. The tree is a desert growth, having a long tap root. It will grow in hot and arid desert lands and yield from $800 to $1000 an acre when in bearing.

The pistachio is about the size of an almond, with green meat and of appetizing flavor. It is used most extensively in candies, sherbets, ice cream and sweets generally. It formed a principal ingredient in the Turkish nougats introduced at the Chicago Fair. It is the highest priced nut in the American market, costing twice as much as the most expensive papershell pecans and three times as much as the best almonds, off both which heavy profits are made.

It is likely that the practical American farmer and orchardist of ordinary means will be more interested at first in the ordinary crops of field and tree when he settles in Arizona and will interest himself in those that are strange to him but of greater value, though slower return, after he has acquired experience. Of those things with which he is familiar he will find that they all thrive about Yuma and produce the fullest and best of crops. Corn and pumpkins cannot be grown to greater advantage anywhere else in the world. Wheat, rye and oats thrive and yield heavily. Potatoes reach perfection. One of the sweet variety produced by George Crowley near Yuma, and he will furnish an affidavit concerning it, weighed forty-two and three-quarter pounds. It would not go into a barley sack. All sorts of fruits, deciduous and citrus grow in the finest form and of the finest flavor. The fruits, as is the case with the melons, tomatoes and other products, ripen weeks earlier than anywhere else in the country, so that the Yuma farmer has a monopoly of of these long enough to ask almost any price he wants.

2

2—Truck load of barley, grown five miles from Yuma, being delivered by Pioneer Transfer Company.

Alfalfa and Cattle Great Staples.

Here is something about alfalfa and cattle that will serve as a brief example of what is being done by nearly every land owner in the Yuma Valley:

On his ranch about twelve miles below Yuma, W. H. DeBerry has one 40-acre field of alfalfa from which, during the season of 1903, he cut 160 tons of hay, which sold in Yuma for $11.50 per ton. He also harvested from the same piece 6700 pounds of alfalfa seed, which he sold for thirteen cents per pound. On the same forty he pastured eighty head of cattle for six months, the going price for such pasture being $1 per steer per month. The total income from this forty acres for the twelve months was $3181, or $79.53 per acre.

Hog raising is one of the profitable industries of the Yuma Valley, swine doing splendidly there. Cattle have always been a source of wealth, and poultry brings cheering returns. Hens lay throughout most of the months of the year.

The growing of blood horses and other stock is being entered into extensively and some valuable and famous animals are owned in and about Yuma.

The largest pedigreed registered Hereford herd in America is located in this borderland. The winners at the Chicago and Kansas City fat stock shows have been range-raised cattle. The phenomenal growth made by the winners at Denver on beet pulp and alfalfa promise much wealth when these crops can be grown unstintedly under irrigation.

From one-third of an acre Bert L. Nunnaley gathered 95 sacks of sweet potatoes, which he sold for $149.63, an average of $448.89 an acre.

Conditions about Yuma are ideal for raisin growing. The vine produces well and there are never any drawbacks to drying.

Grape fruit, lemons, limes and oranges find their natural home in this climate and soil and grow to fine size and have fine flavor. During the fifty years the Americans have lived at Yuma there has been no record of frost.

3

5

3 County road and watering trough four miles west of Yuma. 5—Farm three miles west of Yuma.

In February of 1905 J. W. Alexander planted some Missouri yellow corn. He gathered ripe ears in July and immediately planted some of the new seed. From this he gathered corn in the latter part of the following November. The yield was heavy from both plantings.

New Alexandria Has Rosy Future.

Of Yuma as a city there can be only rosy prophecies. The development of the country around her and the building of new railroads, one of which is already being constructed from San Diego, will make her a great distributing center. One of her poets has written of her, "Queen of the desert, she sits enthroned upon an oasis, overlooking the mighty and mysterious Colorado. She has no rival town nearer than Tucson, 250 miles on the east, and Los Angeles, 248 miles on the west; and because of the advantages of her location, never will have."

Some day, the city hopes, traction lines will carry pleasure seekers to a salt water resort on the bay of Lower California. This, it is thought, will come with the growth of the region. The certainty felt that the city is approaching an era of great development has doubled real estate values. The mesa south of the city, which was bare and broken a year and a half ago, is now dotted with pretty homes, entwined in flowers. The streets of the city have been macadamized and concrete walks laid on the principal ones. Bonds have been issued for the erection of a new $50,000 school building. Many new business buildings have been erected and new stores opened and all are doing a thriving business. There is great opportunity in this city for capital. Many manufacturing enterprises would pay.

The social development of the city is attested by the "Yuma Woman's Club," a literary and civic association which has grown to be a power in all the educational, social and moral interests. It has carried out successfully a campaign for a cleaner Yuma, and to-day the city is model in the way of tidiness and sanitary conditions.

All the principal fraternal organizations have prosperous lodges in Yuma.

The rich mineral belt surrounding Yuma must not be passed over in reckoning the factors that are to make her an important city. Many heavily producing mines are being worked within her contributing territory and others are being discovered and prospected. There is much mining activity at all times and the business of Yuma is given additional impetus by this industry.

That Climate Isn't so Bad After All.

Who that hasn't lived there has not heard stories about Yuma's alleged torrid summer climate? The people there protest, but the supposedly humorous yarns circulate just the same. The enterprising citizens are working to put an end to what they term a slander. They deny that their climate is an objectionable one, and, on the other hand, declare it to be one of the most enjoyable and healthful. That they have a few hot weeks in the summer they admit, and say they are glad of it, for it is these hot, dry days that ripen the fruit and melons so much earlier than in other sections and bring thousands of dollars into the pockets of the farmers.

Professor Hackett, head of the United States Weather Bureau at Yuma, has issued an official encomium upon the climatic conditions of that region. A stranger, heavily clothed and with his system fortified by a generous diet, happens to drop off in Yuma on a warm summer day, he says, sizzles in his own accumulated heat and goes away to say that the weather nearly killed him, when, as a matter of fact, it would have been a benefit to him had he experienced it under proper conditions. There is no humidity, and on June 24, 1902, when 116 degrees were actually recorded, men continued work in the harvest field without discomfort to themselves or injury to the stock.

The rain average is given as three inches a year—"about enough to keep the dust laid." Because of proximity to the Gulf of California, the professor continues, the Yuma region escapes aridity, which is such a discomfort to animal life and retards plant growth.

The sandstorms that are sometimes spoken of as occurring in Yuma are myths, this official authority declares. Sometimes there is a wind of thirty or forty miles an hour that raises dust clouds such as experienced everywhere "except upon the ocean," but the maximum is rarely more than twelve miles an hour. Concluding, Professor Hackett says poetically: "Yuma basks in the sunshine of a winter as beautiful as any in the world, and as the warm weather of summer approaches, the Gulf of California gives us breezes as soft and cooling as ever rippled the Aegean or made music through the palms of the Ionian Isles."

1—Ideal country home, one and one-half miles west of Yuma. 3—Canal from Colorado River, three and one-half miles below Yuma. Intake of the Irrigation, Land and Improvement Company. 6—Ranch scene, two and one-half miles west of Yuma.

5—Ely Fop, Imported Shire; property of W. H. Lyon, Yuma. 7—Date-bearing palm, twelve years old, near Yuma.

2—Scene on water front at Yuma. 4 Palm drive, one mile from Yuma. 8—Main street, looking south, Yuma.

Agua Caliente Springs as a Resort

Agua Caliente Springs is a health resort that is in easy reach of Yuma. It is situated in the southwestern part of Maricopa County and is famous in the territory for its curative powers. It is also becoming known throughout the country. Eastern people who have been drawn to it by tales of the wonderful efficiency of its waters have carried home with them verification of these statements concerning its merits. The springs were long the "medicine waters" of the Indian, and the white man who squatted on them was subject to frequent attacks by the savages, who looked on the Agua Caliente as the free hospital of the desert where the red man when ill could go and by bathing and drinking be restored to health.

To-day there are at the springs adequate and comfortable accommodations for all who may visit them. Not only does the visitor benefit by the waters, but there is the pure air and the excellent diet of fresh country food, the finest milk, eggs, vegetables, fruits, berries and meats to help in the rebuilding of the afflicted person. Many persons who need only rest seek these springs and go away round of body and firm of step. The Agua Caliente is one of the features of the territory.

The springs were squatted upon in 1860 by King Wolsey, one of the early settlers of the territory. He appropriated the water, dug irrigation ditches and cultivated the land adjacent. His ranch was raided three times by the avenging Apaches and 300 head of his cattle stolen.

Within a few years after its settlement by Wolsey, the land was surveyed and patented and is now owned by Mr. Althee Modesti of Yuma. Mr. Modesti has made great improvements, having built a commodious hotel, bath houses and store and run a telephone line and constructed good roads to Sentinel on the Southern Pacific railroad. There is a mail to the springs every day except Sunday and a good school is maintained there.

Some wonderful cures have been made at these springs and their reputation is high in the southwest, where the people have learned to know the truth about them. Especially are the waters fine for rheumatism and all disorders of the blood and skin. Persons that have spent thousands of dollars at the health resorts of America and Europe have visited the Agua Caljente and found the permanent relief they had sought so long. The waters are said to be a positive cure for dyspepsia and all stomach troubles. Nicotine and alcoholic poisoning also give way before these waters.

This is the official analysis, which shows that the waters contain the necessary curative media:

University of Arizona,
Arizona School of Mines,
Tucson, Arizona, July 7, 1902.
W. P. Blake, Director, Laboratory No. 5228.

WATER ANALYSIS.

Received from Althee Modesti, Yuma, Arizona.
Source, Agua Caliente Springs. Combined as follows:

	Parts in 100,000
Sodium chloride, NaCl (common salt)	32.00
Sodium, carbonate, Na2CO3	5.30
Sodium, silicate, Na2SiO3	8.02
Sodium, sulphate, No2SO^4 (Glauber salts)	15.00
Potassium sulphate, K2SO4	1.57
Calcium sulphate, CaSO4 (Gypsum)	3.95
Magnesium sulphate, MgSO4 (Epsom salts)	1.62
Magnesium carbonate, MgCO3	0.46
Iron and alumina, Fe2O3 and Al2O3	0.30
	68.22
Lithium	trace

J. S. MANN,
By R. G. Reed, Assayer.

For nine months in the year the climate at Agua Caliente is perfect and the resort is much sought by those needing merely recuperation. All sorts of outdoor and indoor recreation is provided. The air is always warm, light and dry. Invalids may remain out doors nearly all the time.

The rates at the Hotel Modesti, where excellent sleeping accommodations and the best of healthful food are supplied, are but $2 per day and upwards, including the baths.

To reach Agua Caliente the visitor takes the stage at Sentinel, fourteen miles away. The round trip fare is $5. Other information desired may be obtained by addressing Althee Modesti, Yuma, Arizona.

Moonlight on Klamath Lake, Oregon.

Big Reservoir Saved by Women.

The work of four women saved the immense reservoir of the Wyoming Development Company, forty miles north of Laramie, from destruction. The water in this reservoir covers an area twenty-two miles in circumference and is held back by an earth dam a mile and a half long.

Miss Helen McGill, daughter of a ranchman, and Miss Wilberta Knight, of Laramie, were riding over the dam in the evening when they noticed that the water had begun to cut a hole through the bank. The girls galloped to the home of the caretaker but he was absent. Telephoning the nearest ranchman, ten miles away, they, with two other women, hurried back to the reservoir where two of them, with a team, hauled hay and threw eleven loads of it into the crevice, the other two shoveling dirt on the hay. At daybreak men arrived and finished the repair work.

High Prices for Broom Corn.

The high prices for broom corn which are announced through reports coming from Mattoon, Ill., the central broom corn-growing district of the country, says the Twentieth Century Farmer, is only in accord with other features of agricultural production. In times of low prices for the ordinary farm crops it was not uncommon to hear of broom corn selling for $50 and $60 per ton. The recent high price of $130 per ton seems to be out of proportion to advances in corn, wheat, oats and other standard farm crops.

Broom corn is not, however, a common farm crop and can be classed only as a specialty crop. There are a few districts of country where broom corn seems to be suited to the soil and climatic conditions to produce large yields of good quality of brush.

Triumph of Reclamation.

The Albuquerque *Journal*, New Mexico, says it has had the good fortune to assist in booming session of the Irrigation Congress that has been held. Years ago it urged the reclamation of arid lands by the government. "Fifty years ago," says the *Journal*, it "was regarded as very rash, almost socialistic, at least—to advocate the reclamation of our arid lands by the National Government at Washington just as legitimate as the carrying of the mails. The world does move."

Sage Brush as Forage.

Very few people realize that sage brush, of which there is so much in the West, is of any value for forage. Yet of it Prof. Pammel says: Sage brush on the Western plains is deteriorating because of over-grazing. In many cases sheep have destroyed the sage brush, a plant that supplied good food for winter grazing. The sage brush requires many years to mature. The many fine grasses growing under the shade of this plant have also been destroyed.

California Projects

Imperial Valley is the Flower of the Desert

WATERS OF COLORADO, POURING FROM DITCHES OVER ONCE VERDURELESS TRACT OF WONDERFUL RICHNESS BRING INTO BEING LIVELY CITIES AND GREAT FARMING COMMUNITY WHERE PEOPLE GAIN WEALTH

THE Imperial Valley, down where the southeastern corner of California touches the Mexican border, in what was but a few years ago a part of the Colorado desert, is well named. It holds an exalted station among all those arid spots upon which water has been turned. There has been discussion for a long time as to where the Garden of Eden was located, and while this has been going on Nature has produced the Imperial Valley to show men that they needn't worry about the spot where the mischief-making apple was produced. Its equal exists today for humanity to see in the real and build homes upon.

The suddenness with which the Imperial Valley burst into being reads like a tale of the Arabian Nights. For centuries the hill and rock-rimmed vale of dust and drouth had lain in a verdureless existence under the unclosing eye of the sun. Then water came and of a sudden the green things were shooting into the sky. In every direction vegetation began leaping into being.

In 1900 the Imperial Valley had never been heard of. Geologists were familiar with the Salton Basin and sink, but the green valley with the name indicating its claim to priority in the world of agriculture, did not exist as such. Floods had shown that the soil of the basin was capable of giving plant life a luxuriance known in few other places, but the canals and systematic irrigation had not come.

Less than three years later, in what had been known as a desert sink, there were miles of irrigated fields, growing orchards, high-reaching corn and maize and prolific gardens. Pretty and thriving towns were scattered about, six in all, the central one, Imperial, being a small city, and Calexico coming along at a rapid rate. There were handsome farm houses and town homes and on the main streets of these little cities were fine business buildings and stores, doing a rushing business, for the farmers of the Imperial Valley were always prosperous men.

Then the Railroad Came.

Then the railroad—the Southern Pacific—came. A line was built into the vale entering Imperial and Calexico. The builders had to hustle to get in abreast of the first development. Interurban electric lines have been constructed since.

Today what was a corner of San Diego County has been granted leave by the Legislature to become a county itself, under the name of Imperial, with a full set of officials and is ready to take an active place among the political divisions of California. Imperial and Calexico and the other cities have grown as the country has grown. New people are coming in. There is room for many and rich land for them.

There are a main canal, miles in length, and extending through two countries; nine hundred miles of distributing canals, some of which are ninety feet wide and from eight to ten feet deep, and many miles of laterals. There are 260,000 acres of land under these waterways and it is hoped to eventually irrigate about 500,000 acres

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1—The Imperial Depot
2—Alfalfa Crop
3—Stacked Wheat at Storehouse
4—Sample of Architecture at Imperial
5—Imperial Home
6—Hog Ranch

of the desert in California and 250,000 acres just over the line.

In the history of Imperial, extending over less than seven years, there is the story of the later floods. The Colorado broke over the elevated trench, built up by its own deposits, in which it runs, using as a channel of escape the canal that had been dug to tap it. It cut this wider and poured a flood into the valley, spreading wreck and ruin. It filled stream beds in the valley, New River and Alamo River and they helped in the carnival of devastation. The battle against the Colorado, one of the notable events in the history of engineering, was kept up for months, with victory lying alternately with the turbulent stream and then with its final conquerors. Man's ingenuity finally prevailed, and today all danger of flood from the Colorado in the Imperial Valley is past. The river is under complete subjugation and its floods have been shut out forever from the valley. It is under as thorough control as if held in a conduit, and only such water as may be needed to fill the ditches will enter Imperial henceforth.

The first water to enter the Imperial Valley in a canal was brought to a point near Calexico in 1901. There were irrigated at the start 1,000 acres. Within two years 10,000 acres were covered with farms. Remarkable growths had been made by shade and fruit trees during the short time since the first irrigating and some crop records had been established by farmers that brought the name of Imperial more prominently before the world than ever before. The land was easily prepared for irrigating, being level, and easily tilled and even the first season brought profits, alfalfa and livestock being the principal products.

Surely it is Almost a Miracle.

Surely there has been almost a miracle worked at Imperial. The mere facts are enough. The tale can be told in brief synopsis. The land was of marvelous richness and depth, the climate was such that almost any fruit, nut or plant grown in the world would develop and ripen in it, and the water, bearing still more riches for plant life was brought upon it.

That was all there was to the story of how Imperial sprang into existence. You have seen some dry corner in a field where a leak has occurred in a pipe, or water has been spread on the particular spot by some other means and how the vegetation has jumped up there. It has been so at Imperial. It is a place of cereals, tropical fruits, of the date and deciduous fruits, of forage plants, garden vegetables, cantaloupes, in the midst of the desert.

In this nursery of nature it was nature herself that aroused men to the bringing of the flow from the Colorado, whirling past the parched corner that needed its water so badly. In 1891, the Colorado, which is about sixty miles from the Imperial Valley, with a rim of hills intervening, remained at a high stage for an unusually long time because of heavy rains on its watershed above. This resulted in the flooding of thousands of acres of land in Mexico and in a large flow into the Salton basin and sink, the river breaking through the rim that had shut it out of the depression. This flood is well remembered.

Something of the topography of this region, as well as the facts of its productiveness, should be known to the reader who is interested in its marvelous story. It is probable that the Colorado river itself formed the Salton Sink into which centuries after it was to pour its waters again, regulated for reclamation. Salton Sink was probably once the upper end of the Gulf of California, into the northern end of which the Colorado emptied the inconceivable burden of silt and other soil matter that it carried down in its turbulent race. The annual deposits gradually formed a delta which finally extended across the gulf to the Cocopah Mountains, making a large inland sea. As the silt barriers grew the flow into the sea grew less and was finally cut off entirely, except during the overflow season, when a layer of mud would be formed over the gently sloping plain that had been created. A succession of these layers was shown in sinking for artesian water at Imperial. Boring was carried down through 598 feet of soil and no bedrock was struck and no water.

There are still to be seen, about sea level and on the north and east sides of the valley an old sea beach strewn with logs and the shells of the periwinkle. Several fresh water springs flow from this beach in the north of the valley and there are flowing wells along the line of the Southern Pacific Railroad. Mud volcanoes on the east rim of Salton Sink, giving their name to Volcano Lakes in the vicinity, send up quantities of hot mud that makes cone-shaped hillocks about their craters or flows sluggishly down the incline.

Low Hills Shut out the Colorado.

The Salton Sink is hemmed in by scattered

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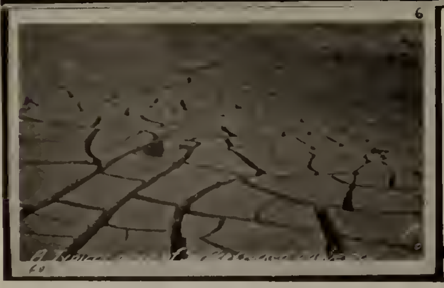

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1—Looking up New River showing the cut and washed banks of New River, Aug. 30, 1906. 2—Scene during construction of dam. 3—Clamshell bucket dredge with bucket ready to drop. 4—The heaviest rock fill in the main channel of the Colorado River at the Salton Sea dam. 5—Clark dam, January 27, 1907. 6—Difficulties of levee construction. This is the kind of soil that caused the trouble, silt and clay that cracked, giving water an opening. 7—Levee construction. 8—One of the largest drops in the Imperial Canal at Sharp's, 7 miles east of Calexico in Mexico. Yuma Project, California-Arizona.

spurs of mountain ranges. The Chocolate range, an extension of the San Bernardino Mountains, lies on the north; the San Jacinto and Cocopahs are on the west and the southwest, and in these is Signal Mountain, at the north end of Laguna Salida.

At the northeast the Colorado is kept out of the depression by thirty or forty miles of sand hills. These are capped in many places by mesquite trees. The elevation of the valley ranges from sea level at the boundary to 287 feet below sea level in the trough of the Sink. The shifting hills on the west are known as Superstition Mountains because of their unstable character. The hills move by the sand falling over the top under the influence of the wind, in whatever direction it is blowing.

The soil that the Colorado has been forming throughout the centuries has been found to be of two distinct classes. One is a hard, compact clay, wetting slowly and becoming plastic and adhesive. It is found along New River and is formed by backwater. The other is a silt or loam soil, found in a broad belt in Mexico and extending along and to the east of Salton Channel. This latter soil, formed by flowing waters, ranges from fine silt to sand, with occasional clay. It is easily tilled, absorbs water readily and melts down quickly with irrigation. It is coarse and sandy in Mexico, but grows more clayey toward the Sink.

1—Cotton Crop.
2—Sacked Wheat.
3—Main Ditch.
4—Sorghum.
5—Showing Irrigating.
6—Cattle Ranch.
7—Cantaloupe Crop.

A few years ago J. E. Roadhouse wrote of the valley as follows:

"To the eye most of the plain of the valley appears smooth and level, with occasional sagebrush and arrow weed. Where moisture is plentiful, arrow weed grows abundantly, forming dense groves, six to ten feet high. Around the salt spring, called Soda Spring, near the mouth of San Felipe Creek, a heavy growth of salt grass occurs, accompanied by mesquite. Cottonwoods and willows border Cameron and Blue Lakes, in the course of New River. The creosote bush is widely distributed. In the region of Salton Sink, the saltwort is abundant and suggests the presence of alkali."

Cameron and Blue Lakes were formed by a flood of the Colorado that found its way from Volcano Lakes north and past the base of Black Buttes—terminus of the Cocopahs in Mexico—cutting its way to the boundary at Calexico, about eight miles west of the Alamo crossing. Much of the territory below the boundary was flooded. There had been no flow to the north of this for several years.

A plan to turn water into the Salton Basin was advanced as early as 1850, but it was proposed to make an inland sea of it instead of using the flow of the Colorado for irrigation. John C. Fremont was interested in this plan. It contemplated cutting a canal from the Gulf of California and forming a sea covering 500,000 acres that would, as it was thought, put an end to the hot winds that blew from the south over the San Jacinto Mountains and injured crops in San Diego and Riverside counties. This sea would have been twenty-five miles wide and sixty miles long, and perhaps the vapor from it would have produced more rain. Late in the '50s a bill was introduced in Congress asking for government aid in building the canal.

The breaking out of the Civil War prevented the carrying forward of the plan and also the great loss of fertile land that it would have entailed.

Floods Show Soil's Fertility.

The flood of 1891 will be remembered well, as much attention was paid to it by the daily press. It lasted from March until July, and the lower levels of the Sink were covered. The flood found its way to Salton in the northern end of the region. When the waters went down from the face of the vale there followed a riot of vegetation. This was the first transformation. The feed that sprang up was so rich that stockmen drove herds of cattle across the intervening barren stretch and fattened them in the valley. Water fowl became abundant. Wherever the flow had reached there were green things growing with a luxuriance that astonished the eye. The stories of the change were carried out by stockmen, engineers and others and in a short time wide attention was being directed toward the region.

Capital took notice. Engineers had for years been devising plans for bringing the wasted flow of the Colorado through the rim that intervened between it and the valley and spreading it over the lands, but money had always been wary, fearing that the risk involved was too great. The vegetation that followed this flood of 1891, however, had the same effect on capital as would the finding of gold studded ore in a mine.

From 1893 to 1896 there were many projects looking toward reclamation and the attempts to enlist the aid of capital were numerous and more or less successful. It was seen that the reward of investment would be great if attended with success, but that there was a risk, as the Colorado was a hard stream to handle.

The land grabber, feeling that reclamation was at hand, made desert filings and companies offered to locate settlers for a fee, though there was as yet no chance of farming.

In 1893 the Colorado River Irrigation Company was formed. Its plan was to divert water from the Colorado below Yuma and convey it to the Salton Basin for irrigation and domestic purposes. The financial depression of that time prevented this company doing more than make preliminary surveys. The prize was too great, however, for reclamation work to be stopped permanently. In 1906 the California Development Company was formed. It purchased all the rights of the preceding company. To avoid constructing an expensive fifteen-mile tunnel it was decided to make a long detour southward and westward through Mexico and then northward again into California.

As the law of Mexico provides that Mexican corporations only shall control enterprises within a certain distance of its borders on the Mexican side, a Mexican corporation was organized which purchased 100,000 acres of land along the boundary, through which the canal must pass, and concessions and authority to proceed with the work inside the boundary of Mexico were obtained from that government.

The company solicited settlement under the desert land act, all the acreage being public up to the Southern Pacific grant, in which the railroad owned every alternate section. Residence is not required under the desert act, but a payment of twenty-five cents an acre is necessary at the filing of application, and there must be satisfactory proof of work worth at least $1 an acre annually for three years. To obtain a patent, proof must be given that one-eighth of the land has been irrigated and brought under thorough cultivation, and that there is perpetual right to water from a reliable source. Feeling sure of a water supply, settlers began taking up the rich lands.

During the summer of 1902 the system consisted of the temporary wooden heading at Hanlon's, seventy feet wide, on the Colorado, and eight miles of excavation and thirty miles of natural channel above the crossing at Monument 218. Here the system branched to supply the mutual companies. The laterals, as a rule, followed section lines and were given the names of trees and flowers.

Famous Battle with Flood.

The system of supplying water to lands that was worked out was that of the mutual company. The Development Company and its twin Mexican corporation, La Sociedad de Yrrigacion y Torrenos de la Baja California, working in conjunction, accomplished this. The former delivered the water to the latter at the boundary, and the Mexican company in turn delivered it to the mutual companies at Sharps, on the American line, these latter finally supplying it to the farmers.

The mutual companies are organized on lines similar to those in other parts of California, the system being a very satisfactory and equitable one. To obtain water it is necessary for the farmer to buy stock from one of the mutual companies which has obtained it from the larger twin concern. One share of stock goes with each acre of land.

Another large organization, the Imperial Land Company, was formed to act as the agent of the Development and the Mexican companies in the sale of water rights or mutual water company stock and townsites, and to otherwise further the interests of the parent concern and the settlers. The mutual companies deal with it and the Development company, and the settlers deal with the mutual water companies.

Prosperity was smiling upon this wonderful valley and its growth and that of the more important towns within it, Imperial and Calexico, which were growing with wonderful strides, when high water in the Colorado in 1904-5 caused the inflow of too great an amount of water, the floods cutting out canals, overflowing the country, destroying ranches, and threatening more inundation of property by filling the Salton Sea. The rising of this sea caused frequent changes in the Southern Pacific tracks and brought the railroad company to a realization of the enormous damage that would ensue unless the river were restored to its channel and kept there permanently. The flooding was a good thing for the farmers eventually, for it led to this permanent work being done, though at an enormous expense. Heavy levees, rock-filled concrete work, rock and brush dams and bulkheads, brush mats, pinned down with piles; rock fills with stone—some blocks of granite weighed tons—brought from all available quarries within a radius of 400 miles, and massive gates, were features of this work. Engineers and tourists came from all quarters to view it. On November 4 the works were of sufficient strength to turn the river back into its former channel. On November 29, the treacherous Gila, which has a habit of rising like a flash, rushed down with all its additional force and undid the work of months. The Colorado then poured its full volume into Salton Basin; its channel below there was dry. A little water following another old flood channel, the Paredones River, passed into Volcano Lakes and then entered Hardys and so into the Colorado.

In February, 1906, there was another but lesser flood. Then came the regular June rise, which was prolonged through a greater part of the summer. The forces that were determined on saving Imperial and the Southern Pacific line worked frenziedly. A splendid gate of concrete and steel was built and below this a wooden gate to regulate the flow after it had been controlled. The foundation of a great dam, similar to the works that had been swept out, was laid.

The massive gate, expected to withstand three times the force that would be hurled against it, broke at the onslaught of the flood and was swept away.

H. T. Corey, chief engineer in charge of the work, and Epes Randolph, head of the Southern Pacific division there, took hold and work went on again as if no defeat had been met. It was a desperate situation and it was met with desperate and tremendous effort. All the equipment and force of two divisions of the great railroad corporation were thrown into the breach. Contracts were also made with the Santa Fe and Salt Lake roads to help haul earth and rock. Twelve miles of special track were laid, switches and spurs put in, 1,000 feet of bridges built, fourteen steam shovels were set to work, and eight trains began going and coming night and day, hauling rock, brush and other material with 400 cars—28 trainloads a day. Eighty acres of land were stripped of brush and willows to make mattresses. The whole current of one of the major rivers of the world had to be curbed with a mud foundation to work on and the water racing over it all the time.

Overflow Checked for Good.

This final effort put the Colorado in chains for all time. The great overflow was effectually checked in February of this year. The Southern Pacific Company had saved the Imperial Valley.

In this valley of remarkable history, with its scars obtained in battle against the force of a mighty river which has been finally brought entirely under subjection and whose waters are making it fruitful, there is one of the fairest fields for agricultural and business enterprise that the world knows. The richness of the land is incredible. The crops that are taken off are making the farmers there now rich, and there is a steady inflow of population. The growth of Imperial and Calexico is rapid. There is room for all sorts of new enterprises in these places. Capital can find no better place for investment. The density of population that will develop in this valley will perhaps be greater than that of any other part of California.

New railroads are looking toward the valley. The Spreckels line from San Diego to Yuma will pass through it. Electric systems have been projected. Imperial, the hub of the valley, and Calexico, centrally located, have good railroad service now, valley products being shipped from those points, but they will be still more important as railroads centers when the new lines pierce this region. A line has been built from Calexico into Lower California. These towns are very progressive. They are electrically lighted. They have banks, newspapers, good hotels and stores carrying excellent stocks. The business buildings are quite pretentious. Many inducements for investment are offered by them.

Alfalfa is probably the most important crop up to the present time. The major part of the orchards, especially of tropical fruits, have not yet come into the most extensive bearing, the planting of grains and forage crops having occupied the attention of the farmer in the main during the first years. Such orchards as are bearing, however, are giving splendid returns, and there is a large acreage that will soon be ready to swell the fruit output of the valley.

Alfalfa at this time means there what the orange does in Riverside. It will be the most profitable crop until such time as intensive farming shall have reached its height, and fruits, vegetables for shipping and canning, melons, and the many other highly profitable crops that can be grown occupy a larger part of the acreage. Twelve tons per acre of cured hay in a year is the record of the land, with a good stand and reasonable care. Besides this the fields will furnish three months of winter grazing. Up to this time alfalfa has paid the producers more money than any other field crop. The exceptional profit of $125 a year an acre has been made in a few cases. It is easy to net $25 a year an acre. Specimens of alfalfa ten feet in length have been exhibited. Here is something from one of the papers of the valley about alfalfa production:

"In conversation with some of our best farmers, we learn that they are having a new experience with alfalfa this year to anything they have ever experienced and it all goes to prove that Imperial Valley is the best alfalfa country that has ever been discovered as yet. Mr. E. E. Forrester planted a field to alfalfa last January, and began pasturing it in April. He took the stock off about June 1, at which time it was cropped close. Within three weeks' time it was ready to cut, and was harvested, turning off about a ton and a half of hay per acre. Mr. Forrester says that it will be ready to cut again in three weeks' time from its first cutting and that it is a thick stand and will make as large if not a larger crop than the first one. He also says that his neighbor, W. H. Brooks, is having to hustle the hardest kind to keep his eighty acres of alfalfa harvested into hay as fast as it grows.

"Mr. Forrester is an old time Californian, having spent many years farming in San Luis Obispo county, and has been familiar with alfalfa for a long time, but he says this is the finest alfalfa country he ever saw. In no other place known will alfalfa produce a heavy crop in three weeks. Alfalfa seems to grow spontaneously, it is springing up along the ditches, beside the roads and in every place that gets irrigated and on all sorts of land. Our valley, in a few years, will be as famous for its alfalfa fields and rich farms and farmers, as Riverside is for its oranges, or San Diego for its bay and climate."

Wonderful Plant Growth in Valley.

A tall man entering a field of milo maize in this valley is lost to view. It grows with surprising rapidity and bears heavily. It serves the purpose of Indian corn in fattening and hardening hogs or cattle. It is a summer crop, following the wheat or barley harvest. It is an inexpensive crop and most farmers harvest it by turning their cattle and hogs into it, though it brings about $18 or $20 a ton. The yield is from 3,000 to 4,000 pounds an acre.

Barley yields from fifteen to thirty sacks an acre on this land, and wheat about forty-five bushels. It is often found more profitable to cut barley for hay. It produces from three to four tons of cured hay per acre, worth about $8 a ton. A great quantity of barley and wheat is shipped from Imperial and Calexico.

After the wheat and barley crops have been taken off the farmer may spend a few months at the seashore and upon his return plant what are known as the summer crops, Kaffir corn, Egyptian and Jerusalem corn, milo maize, sorghum and millet. Dairying is a potential industry in the Imperial Valley. Those engaged in it are finding that it is extremely profitable. Butter made at the Imperial creamery is shipped to San Diego, Los Angeles and other towns. Its rich, natural yellow was so pronounced that complaint was made at first in these towns that artificial coloring had been used. Abundance of green feed produced this coloring.

As a cantaloupe region the Imperial Valley can not be surpassed. These melons are of fine flavor and are marketed as early as May. Some farmers have made as much as $200 an acre from them. The average is $100. These unusually early melons bring high prices in New York and Chicago. Hundreds of carloads are shipped.

For early fruits, when the orchards come into bearing generally, the Imperial Valley will be among the first of all regions. It is expected that fruit growing will be a money-making industry. Many orchards are being planted. Some now in bearing are yielding heavily. This will be a great fig country. The Smyrna fig has a natural home there.

There are strawberries every day in the year at Imperial. Apricots of this valley are the first in the market. W. T. Swingle, government expert, says that this is a wonderful region for the production of the Sahara date, Neglet Noor.

The breeding and raising of blood horses and cattle is rapidly becoming a recognized industry in the Imperial Valley. The climate and the feed produced are especially favorable. Experts say that Kentucky will not excel this spot after a while as the home of thoroughbred horses.

Hog raising brings money. One farmer made $15,000 in a year at this. The pigs are allowed to graze on the alfalfa until weighing about 150 pounds and are then turned into a field of ripe barley or Kaffir corn and fattened for the market. Though the climate from June to September is hot, it is also dry and seems suited to the hogs which thrive.

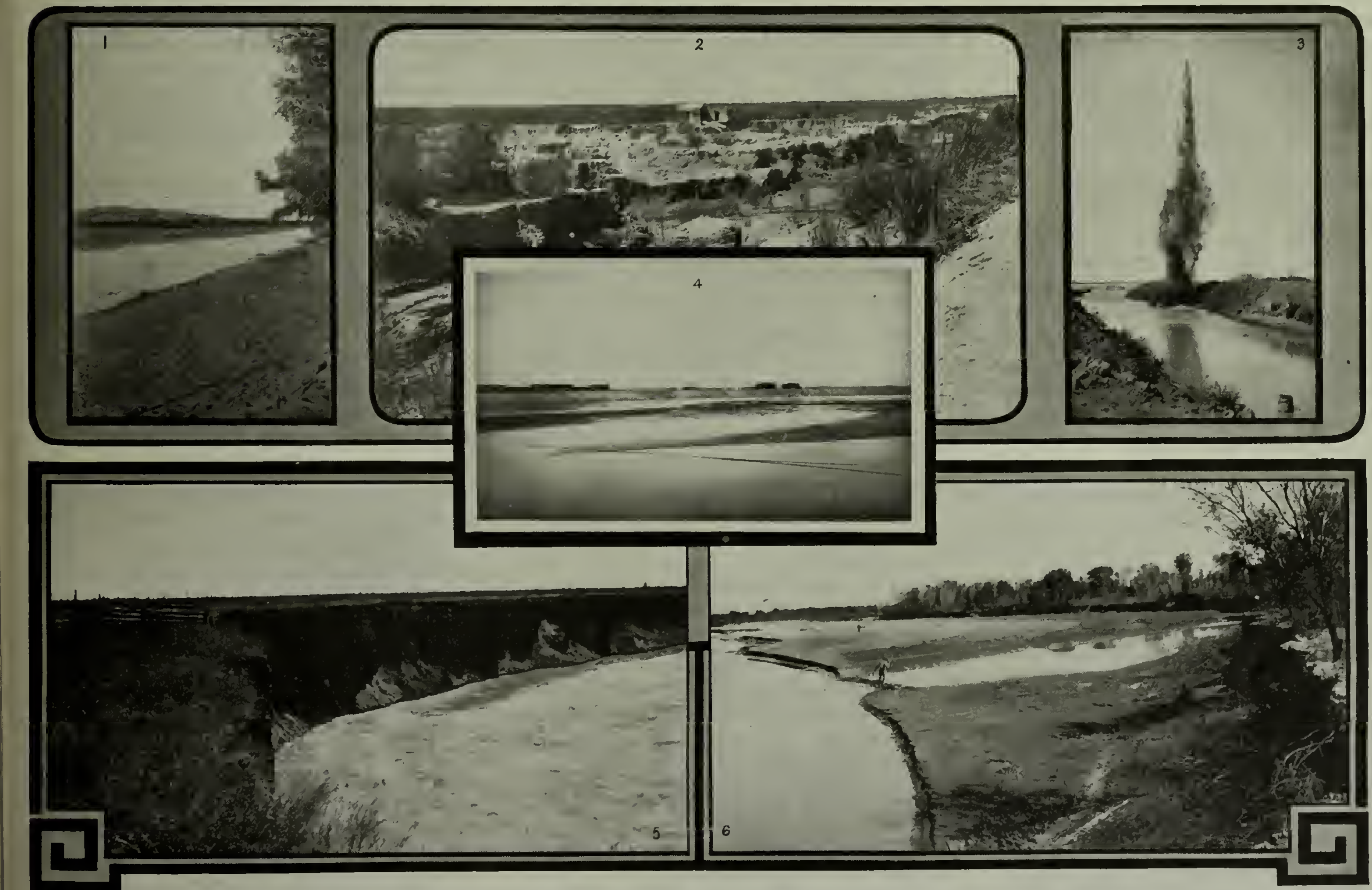
Finest Beef is Produced.

Beef cattle of the finest are grown in this valley and the juicy meat from animals shipped from Imperial is becoming known all over the coast of Southern California. There is unlimited nutritious feed for the stock. At present both fat hogs and cattle are being shipped alive, but the establishment of extensive packing houses is being considered.

Cotton will be grown with great profit during the next few years. Experiments show that the long-fibred Egyptian variety will yield well. Rice is also destined to become an important product, as there is plenty of water for flooding.

Sugar beets have been proven to be successful and sugar factories will come. Beets produced near Imperial tested from 16 to 18 per cent saccharine matter and showed a purity of 90 per cent.

All the known vegetables yield heavily. Tomatoes, cabbages, onions, peas, beans, asparagus, sweet and Irish potatoes, radishes, lettuce, turnips, and all the rest have been grown in great quantity.



1—Imperial Valley System, California, looking northwest from below Hind Dam up the channel of main break, Nov. 1, 1906. 2—Showing how the river has cut into the Imperial Canal near the five headings, and destroyed the canals in general. The canals have to be rebuilt to the five headings from a point one and one-half miles east of the five headings. 3—Blasting on Imperial Canal. 4 Colorado River break General view of new closure work Jan. 25, 1907. The south end of dam that effected the December closure is at about the point where the two locomotives are shown. 5—Where New River ate up a farm before floods from the Colorado were checked. Picture shows depth and richness of Imperial Valley soil. 6—View showing the big bend where the channel of the Colorado River has cut away from the old river bed, just above the headworks of the California Development Company. Yuma Project, August 26, 1906.

Canneries for vegetables and fruit are soon to be established.

Poultry raising is also a successful industry. Chickens and turkeys do well and the hens lay longer and better than they do in colder climates.

A five-acre vineyard of seedless sultana grapes was planted in the spring of 1902, and in June of the following year there a was good crop of grapes upon it. One vine matured twenty-one large bunches. Trees have grown three times the height of a man in two years. The tree and plant growth in this section is almost unbelievable.

The class of colonists in the Imperial Valley is of the highest grade. People of refinement and intelligence have flocked to this Eden. Graduates of the leading colleges and men that have been prominent residents of other places have cast their lots there. The social conditions are of the best. There is a splendid school system, with a large number of commodious buildings.

Climate is Warm But Dry.

The thermometer climbs pretty high, but the dryness of the heat takes the discomfort away. The region is a very healthful one.

There are myriads of ducks for the hunter. Fish abound in the lakes, especially Blue Lake and in the canals. There are plenty of quail, also.

The lakes give opportunity for boating. Naphtha launches are run on the miles of big canals.

Each land owner gets what water he needs at the cost price to the Company, plus a small sum to pay cost of distribution and administration of the affairs of the mutual water company. This last item ought not to exceed 25 cents per acre per year.

It is believed that alfalfa, which requires more water than any other crop, will not need more than three acre-feet of water to each acre of land each season. This will cost the ranch owner about $1.75 per acre—$1.50 per acre being the fixed price, and 25 cents per acre being the cost of management and distribution.

For an abundant supply of water at all times, this is considered to be the cheapest water today in the United States, it is claimed, and it is not believed that works constructed by the Government could furnish water at a less cost.

Power is produced from drops in the big canals and the electricity is used in lighting the towns, operating ice plants and for other purposes. Enough can be developed to give a stimulus to manufacturing.

There are many thousands of acres of land below the Mexican line that can be watered. They will produce heavily also and though in a foreign country, the towns of the Imperial Valley will derive business from the population there.

There is plenty of land to be had in the Imperial Valley at reasonable prices. The homesteader or tourist that stops at Imperial or Calexico will have an opportunity of seeing all this wonderful country to the best advantage. Both will marvel. It is worth seeing. It is a place where money can be made.

Orland Project Opens the Way in Sacramento Valley

FROM SMALL BEGINNING IN GLENN COUNTY IT IS EXPECTED THAT OPERATIONS WILL EXTEND UNTIL RECLAMATION OF THE FERTILE BASIN HAS BEEN ACCOMPLISHED

THE Orland Project, in the upper part of Glenn County, California, is the baby of the Reclamation work. The immense probable growth of this baby makes it a most important reclamation infant to the Sacramento Valley and the state.

This small project at Orland, the latest one approved, is the opening wedge toward the reclamation of the whole Sacramento Valley. From this beginning it is hoped to extend the government work until the great wheat ranches have disappeared before the small irrigated farm.

Orland will be the example for the valley. The manner in which the government constructs an irrigation system and the benefits to be derived from a proper watering of lands will be shown the farm owners of the valley. The system of cutting up private holdings into tracts of not more than 160 acres will also be given a test. The reclamation service advises landowners that there is more profit in selling off their surplus at the enhanced value produced by constructing the irrigation systems and giving proper attention to 160 acres, well-watered, than there is in farming the larger areas with only the rainfall for moisture.

The farmers at Orland have become convinced that this is true and have pledged their lands to a Water Users' Association formed there, that the government may establish an irrigating system.

The Secretary of the Interior made an allotment last December of $650,000 for the carrying out of the Orland Project. From 10,000 to 15,000 acres will be irrigated at a cost of about $40 an acre. The preliminary surveys have all been made and a reservoir site on Stony Creek selected. It is known as the East Park Site. About 50,000 acre feet of water will be impounded. Actual work has not been commenced.

Orland Project Leads the Way.

Part of the Orland country is already irrigated. This section is in the thermal belt. Fine oranges and lemons are produced there, besides the other fruits. Table, raisin and wine grapes of finest quality are grown. There are several varieties of soil. Portions are gravelly, while others are heavy and mixed with gravel. All the soil is deep and very productive.

The town of Orland is a prosperous place of 700 inhabitants on the Southern Pacific main line to Portland, Ore.

Supervising Engineer Henny, of the Pacific Coast District, says of this project:

"The greatest importance of this commencement will lie in its furnishing a convincing object lesson of what governmental effort may accomplish; in the certainty that it will crystallize public opinion in favor of rapid extension, in its being a step in the right direction of inaugurating the construction of a system of storage reservoirs which must benefit all valley interests alike, and especially in its leading the way to the solving of the broader problem in which irrigation, control of flood, navigation, delta reclamation and restricted gold mining all play their respective parts."

The Orland Project may well be deemed a unit of the greater scheme that will be carried on throughout the entire valley, and therefore a description of this beginning becomes properly a part of that of the valley and its future.

More land has been pledged for this project than needed. The government asked for 12,000 acres and 20,000 have been pledged.

Some water is ready for delivery now, the government having bought out two private ditch companies, but it will be two years before the storage works are completed.

The dam will be ninety feet high, in a gorge forty-five feet wide. East Park Reservoir site contains about 3000 acres. The water will run thirty miles in the natural channel of Stony Creek.

Earth is the Storehouse.

The earth is the storehouse from which our supplies are drawn, says *Forestry and Irrigation*. Cut off from it, man is like a fish out of water, or a clipped, caged eagle. Directly or indirectly, man must get at the earth or perish. When, some years ago, the last of the public domain worth having had apparently disappeared, clouds gathered on the horizon. Economic pressure began to intensify. Then came the reclamation movement. Already it is furnishing relief. Its possibilities are great. Nevertheless, while rejoicing in these, we should not overlook the census figures showing the increase in our population for a century past. However much land we may reclaim, rest assured there will be plenty of people to occupy it all and to call for more. Wisdom dictates that we should look well ahead.

Extent of Dairy Industry.

The dairy industry of the United States is a congenial study for those who like statistics. The growth has been tremendous, according to the Texas Stockman and Farmer. There are more than 21,000,000 cows milked in the United States every day. Each gives 3500 pounds of milk a year, making the annual output of this country about 70,000,000,000 pounds of milk. It is disposed of in various ways. A little over half of it is required for the making of butter, 1,000,000 pounds of it goes into condensed milk, 3,000,000 in cheese, and the rest is sold as cream, fed to the calves, or divided among the people of the country, each of whom should receive seven-tenths of a pound of milk a day—a good-sized tumblerful. If the cows were all told off and assigned to specific duty in this dairy products business, 6,400,000 of them would be required to furnish the milk, condensed milk and cream; 10,900,000 would confine their attention solely to butter, and would be expected to furnish 151½ pounds a year; 840,000 would be assigned to the cheese industry, and the remaining number would have the raising of all the calves. As each individual in the United States is supposed to eat 20 pounds of butter each year, the Brindle family can not quite supply it, so we still import something like 45,000 pounds, to make up the deficiency. One-third of the Nation's output of butter comes from the farms, where three and a half million farmers and their families still churn it, pack it in firkins or tubs and deliver it to the nearest shipping point. Over 6000 factories make the rest of the billion and a half pounds that we use annually.

The acquirement of woodland in bulk by big timber corporations through fraudulent entry, which has been practiced so extensively and so profitably in the Western States, will be decidedly hindered by the new laws, *Collier's* says. Similarly, that form of 'development' which has skinned so large a part of the Eastern mountain ranges down to the merest scrub will be checked.

Fertile Sacramento Valley Greatest Reclamation Field

WITH all its uplands under irrigation and its overflowed lands reclaimed, a hope which its citizens expect to see realized well within the present generation and much of it within a decade, the Sacramento Valley, in the northern part of California, will be one of the most wonderful scenes of agricultural and urban industry in all the world. Already one of the richest and most favored spots under the sun, this valley, 400 miles in length, and forty miles wide, embracing twelve counties, would be a sweep of luxuriant productiveness over all its area were there a regulated supply of water for all its acres.

The start toward this great work has been made. Private corporations and the government have both begun the task of bringing the destiny of this valley to fulfillment. Companies of individuals have brought some beautiful tracts under ditch. In this remarkable valley of the Sacramento all the products of the semi-tropics and the temperate zone are grown. The far-stretching fields that are now devoted mostly to the production of wheat and hay will yield the orange, the fig, the grape, the lemon, the olive, the pomegranate, every sort of deciduous fruit and all the berries and vegetables with equal prodigality, as demonstrated by the orchards, vineyards and gardens that have been planted under the private irrigating systems, notably in Butte and Sutter counties.

Oranges Grown at Northern End.

Clear to the northern end, Redding, the orange is grown successfully in this valley. Distant parts of the country, noting the name, Northern California, have been wont to place there in their picturing of this golden state the wheat and the maize crops and connect their dreams of oranges and pomegranates, of palm and magnolia, only with Southern California, that other beautiful part of the state, which has by persistent effort and the development of water become a fairyland, famed and loved throughout the world; though it did not have one-half the gifts of nature possessed by the Sacramento Valley. What has been done in the Southland, with all the handicaps that existed, is an augury of great promise for the Sacramento region. Water has raised the value of land in most parts of Southern California until the ordinary purse can not touch it. Land is still comparatively cheap in the northern valley, but it will attain the same enormous value as irrigation spreads.

As a matter of fact the Sacramento Valley sends to market the first oranges produced each season. They ripen in this valley of the camelia and the magnolia fully one month and sometimes six weeks earlier than they do in the southern part of the state. Lemons are also earlier. Of deciduous fruits this valley produces the greater amount of all grown in California. Its production of wine is only surpassed by the counties to the west of it and its olive crop is the largest. The fruitful valley is less known than it should be because the land barons have refused to subdivide. In agriculture and viticulture it savors of Egypt, Syria, Italy and Spain, and at the same time has a pleasant and healthful climate. It is hard to be too eulogistic in dealing with the future of this valley.

It is estimated that the Sacramento Valley contains something more than 2,500,000 acres of land that can be given the beneficial effects of irrigation. Nearly 1,000,000 acres are subject to overflow, though a large part of this produces crops. Water enough can be secured by easy storage and from the flow of the river beyond the needs of navigation to irrigate all the uplands, and such of the overflowed land as may need it when reclaimed, and have a great deal to spare. From the 26,000 square miles of drainage the estimated annual runoff is 26,000,000 acre feet, enough to flood the valley to a depth of nine feet.

There are twelve counties within the area known as the Sacramento Valley, though a thirteenth, Siskiyou, is within the drainage area. The twelve are Shasta on the north, Nevada, Placer, Sacramento, Yolo, and Solano on the south, and Yuba, Sutter, Butte, Colusa, Glenn, and Tehama, intermediate counties.

A bend in Putah Creek, Yolo County, Cal.

The Valley is entered at Benicia, on San Francisco bay, formerly capital of California, and from there to Red Bluff it is 170 miles. These twelve counties named contain an area of 17,815 square miles, or 11,391,600 acres, a territory larger than the states of Massachusetts and New Hampshire combined. These two states have a population twice as great as the whole state of California, containing 157,000 square miles. Almost from the crest of the Sierra on the east to that of the Coast Range on the west, there is hardly an acre of the Sacramento Valley that does not contribute something in the way of wealth to the state.

For years while the wide areas of rich land capable of producing the most valuable crops have lain idle in the summer months, after one cutting of grain, this water has been allowed to go to waste annually. How many millions of dollars have been lost through failure to apply it to this land, ready to give up all sorts of agricultural wealth under its influence, can only be imagined. How many more millions will be wasted before irrigation and drainage are obtained is a matter that lies with the common sense of the people. Men that have opposed these as all great and beneficial movements are opposed in their incipiency are beginning to awaken and lend aid. It does look as if the salvation of the valley were at hand.

Possibility of Dense Population.

A population of 5,000,000 would result in time from complete irrigation and drainage, counting the development of new and existing cities. Within the present time it would not be surprising to see 1,000,000 people in the valley. On the basis of irrigated portions of Italy and France this valley would support 15,000,000 persons.

Farmers that own large tracts are standing in the way of government work in the valley because they do not see how they are to gain by agreeing to sell all their land, save 160 acres, that water may be brought upon it. They say that with the heavy winter rainfall they can make as much money as they want without irrigation. They do not figure the profits from increased values, that would make up for several years' wheat crops, and the opportunity of investment of money derived from surplus lands in Sacramento and other cities that would grow rapidly. Besides, 160 acres make a large irrigated farm, if properly cultivated.

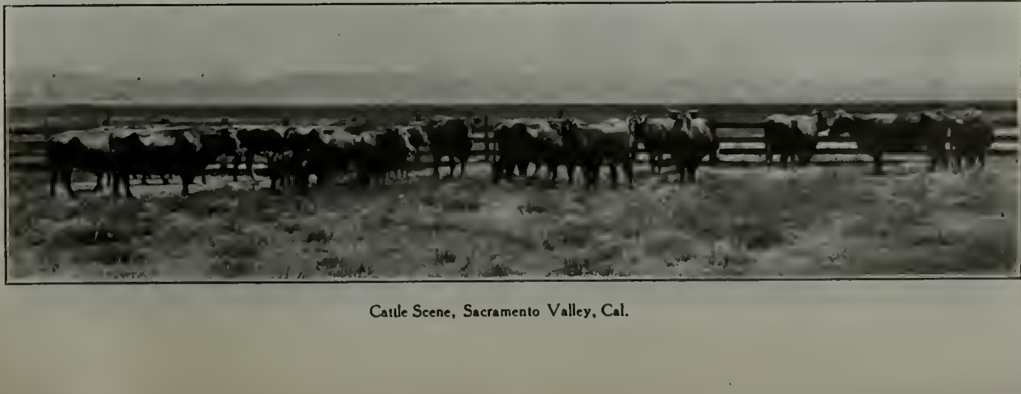
Land in this valley upon which grain crops are grown, is in danger of irreparable impoverishment unless a change is made. The owners of large tracts are confronted with a serious situation. In the absence of irrigation, their land is deteriorating and will be worth little after a number of years. Irrigation is the salvation of this land. Sufficient watering and a rotation of crops, with ability to fertilize where necessary, will not only arrest impoverishment, but bring the land back to a higher state of fertility than ever. It is either expensive fertilization or impoverished soil, or irrigation, smaller holdings and a good price for his surplus land that the future has for the Sacramento Valley farm owner.

Government Willing to do Work.

These are the conditions existing in this valley—one of the most marvelous in the world. It does not look as if the government could be prevented long from dumping its reclamation millions into it.

Were there no rainfall at all in the Sacramento Valley, and it still possessed the water supply it now has from stream sources it would be the greatest region in the world in population and productiveness. There would then be the fullest development of the gifts nature had bestowed and the result would be tremendous crops from never weakening land and a tremendous population, carrying on beside agriculture all the industries known to man.

The government will not do things by half in the valley if given co-operation. Its plans cover it all. It sees in this one of the greatest and most feasible of all the projects it has investigated. The scheme here, as contemplated by the Reclamation Service,



Cattle Scene, Sacramento Valley, Cal.

embraces the irrigating and draining of the entire valley without interfering with navigation. The Sacramento River is navigable to Red Bluff, 250 miles. The great flood water discharge and the ample number of storage basins make the project entirely feasible and inexpensive. The surveys show that in the valley proper there are 2,661,120 acres of land, exclusive of the Sutter Buttes. There are about 55,000 acres of land under irrigation by private projects. This land is producing in great abundance and forms a convincing example of what water will do here.

The preliminary work of the government in the valley has been thorough. In 1889-90 reconnoissance and topographical surveys were made of a number of reservoir sites in Northern California by the United States Irrigation Survey. At that time Clear Lake, on Cache Creek, Summit Valley, on the Yuba River, in Nevada and Placer counties, and reservoir sites known as Nos. 43 and 44, in Alpine county, California, were surveyed. A gauging station was established on the Sacramento River in April, 1895. The work of stream gauging has been extended until there are sixteen gauging stations in the Sacramento River basin, which measure the flow from 82 per cent of it.

Many Fine Reservoir Sites.

Extended investigation brought a number of fine reservoir sites to notice. On Putah Creek, the most southerly of the Coast Range streams draining into the Sacramento Valley, three of these sites were discovered. The Guenoc, most promising of them, was surveyed in July and August, 1903. Another one in Napa County, with a dam site ten miles above Winters and only four miles from the valley, was surveyed. The rainfall in this region reaches 100 inches in a season, giving an immense run-off. A ninety-foot dam would impound 143,300 acre feet and a 100-foot dam 188,000 acre feet. It is believed that 80,000 acre feet could be furnished annually from a reservoir here. On lower Putah Creek there is a site for a reservoir that would hold from 100,000 to 130,000 acre feet. It is estimated that 80,000 acres of land could be irrigated from these two reservoirs. The estimated cost of installation would be from $4.03 to $6.22 an acre according to the type of dam.

Cache Creek and its tributaries have a drainage area of 1192 square miles. Five hundred square miles of this watershed is above Clear Lake, in which could be stored 100,000 acre feet of water at a small cost. To deliver this amount of water the lake levels need not be seriously interfered with. It would be feasible, though, to impound all the flood waters that make their way to Clear Lake by raising the height of the dam at the outlet. This might double the amount of water that could be delivered from the lake. With an outlet channel of 8000 second feet capacity, the cost of this work would be $4.69 an acre, and with an outlet channel of 12,000 second feet, $5.92.

On the North Fork of Cache Creek, the only reservoir site found that appeared feasible was Little Indian Valley. Its storage capacity is estimated to be 76,500 acre feet. The works here would cost $453,000, which is $5.92 per acre foot for the total storage capacity, or $9.06 per acre foot of water available.

One of the most important reservoir site locations, not because of size, but because it is part of the initial government project to be undertaken in this valley, the Orland system, is Stony Creek. In the investigations carried on here the government had the co-operation of the Willows Chamber of Commerce and the California Water and Forest Association.

Sources of Water Supply.

This creek has a drainage area of about 760 square miles. The crest of the watershed does not exceed 6700 feet in elevation, but its proximity to the Coast assures a substantial amount of rainfall.

Briscoe Creek, East Park, and the Mill reservoir sites have been surveyed. The Briscoe site has fifty square miles of drainage. A dam 125 feet high would give a storage capacity of 24,385 acre feet at a cost of $15.17 per acre feet.

The East Park reservoir site is located on Little Stony Creek about two miles southeast of Stony Ford in Colusa County. A 115-foot dam there would impound 26,000 acre feet of water at a cost of $7.94 per foot.

At the Mill reservoir location on Stony Creek near the Sacramento Valley, a dam 95 feet above the bed of the stream would catch 43,735 acre feet at a cost of $13.32.

The Pit River, draining the northeastern part of California, is one of the most important tributaries of the Sacramento. In gorges and canyons in the basin of the Pit some fine reservoir sites have been located by the Service. The Big Valley site, a few miles below Bleher, is the most important. It has 2948 square miles of drainage. It may be possible to drain Goose Lake into the proposed reservoir, which would increase the drainage area to 4200 square miles. The estimated run off of the Pit at the Big Valley dam site one year was 1,245,422 acre feet. It is thought that 1,000,000 acre feet could be supplied annually from this reservoir by diverting the supply now evaporating from Goose Lake. The Feather river is an important source of supply.

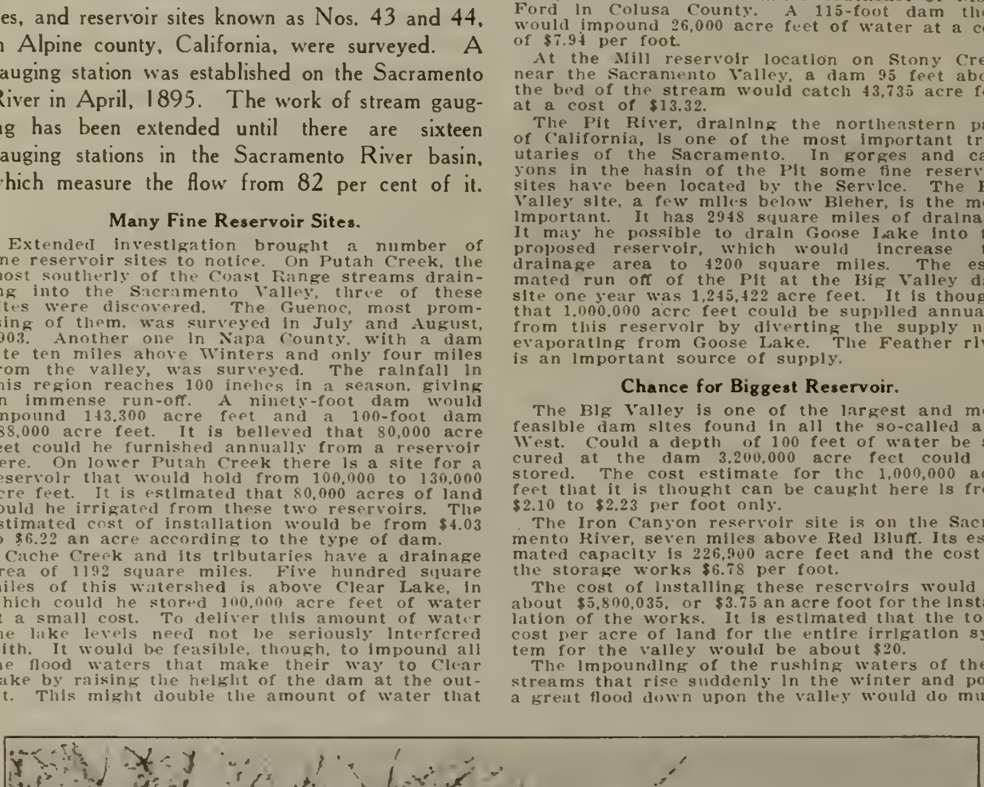
Chance for Biggest Reservoir.

The Big Valley is one of the largest and most feasible dam sites found in all the so-called arid West. Could a depth of 100 feet of water be secured at the dam 3,200,000 acre feet could be stored. The cost estimate for the 1,000,000 acre feet that it is thought can be caught here is from $2.10 to $2.23 per foot only.

The Iron Canyon reservoir site is on the Sacramento River, seven miles above Red Bluff. Its estimated capacity is 226,900 acre feet and the cost of the storage works $6.78 per foot.

The cost of installing these reservoirs would be about $5,800,035, or $3.75 an acre foot for the installation of the works. It is estimated that the total cost per acre of land for the entire irrigation system for the valley would be about $20.

The impounding of the rushing waters of these streams that rise suddenly in the winter and pour a great flood down upon the valley would do much toward insuring the safety of the drained lands along the Sacramento River. Irrigation and drainage are co-relative in the Sacramento Valley. The controlling of the flood flow of Putah and Cache Creeks would take away the great menace to the safety of the famous Yolo Basin. The winter and spring freshets of Putah Creek, now 40,000 second feet, would be reduced one-half; Cache Creek would be controlled in a large measure, as would Stony Creek. The Big Valley reservoir would entirely eliminate the flow from 4000 square miles of watershed.



Almond bloom and Jersies, Tehama County, Cal.

Pecan tree, Col. Taylor's Ranch, near Winters, Yolo County, Cal.

Levees cannot be built that will withstand the highest flood flow of the Sacramento watershed as it is today, the Government engineers say. Without the impounding of waters, destruction of farms by flood may be expected at intervals. With sufficient storage there would be little if any danger of even ordinary levees giving way.

Deterioration of the Land.

With the entire irrigation system of the great valley in the hands of the Federal Government, matters of water supply would be smoothly and justly administered and all systems would be kept in proper shape. J. B. Lippincott, in this regard, has said:

"The success of the reclamation projects in irrigating vast tracts of land in the arid and semi-arid West depends upon the co-operation of the farmer. The destiny of the Sacramento valley is in the hands of the land owners. If the majority of these follow the short-sighted policy of holding the land in large tracts, and using it for raising grain, the soil will decrease in productiveness."

The engineers as yet have formed no definite idea of the location of canals in the valley. A general statement has been made by Engineer Lippincott as to the area that may be irrigated. He says:

> The irrigable land may exceed 2,000,000 acres. It is estimated that 80,000 acres can be irrigated from Putah Creek; 80,000 acres from Cache Creek and 40,000 acres from Stony Creek. The water from these streams should be used to irrigate the higher valley lands near the points where these streams leave the foothills. The remainder of the land on the west side of the valley would have to be irrigated by canals taking water from the Sacramento River. There are approximately 1,047,000 acres of land on the west side of the Sacramento Valley below Red Bluff, above the overflow line of the flood of 1904.
>
> Upon the assumption that 77 per cent of this land is irrigable and that the natural flow of the stream may be relied upon to furnish sufficient water for irrigation until the first of July, and that two acre feet will irrigate an acre of land in the Sacramento Valley, the natural stream flow, together with the water impounded in the reservoirs thus far surveyed would be sufficient to irrigate this west-side land and probably furnish a surplus of half a million acre feet to be applied to the irrigation of the northern part of the east half of the valley, as far south as Chico. It is believed that the flow from the streams draining the western slope of the Sierra Nevada, supplemented by storage, would be sufficient to irrigate the remainder of the east side land above the overflow line of the flood of 1904.

Land Owner Only Obstacle.

The engineers problems connected with this work are not difficult or uncertain. All that is in the way is the land owner. If he will consent to take the water under the terms prescribed by the national government, very simple and just ones, the salvation and future greatness of this magnificent valley is assured and the work will go ahead with a rapidity that will surprise. It would be but a few years before the government would have its storage and diversion dams erected and thousands of miles of canals and laterals carrying the water to all parts of the rich expanse.

Members of the irrigation committees of the United States Senate and House of Representatives devoted two days, in June, 1905, to an inspection of the Sacramento valley and the feasibility of the irrigation project embraced within its borders. The committeemen were accompanied by officials of the Department of the Interior and of the Reclamation Service. The members of the party expressed the unanimous opinion that the great valley presented one of the fairest prospects for an irrigation project in all America.

Irrigation by Private Enterprise.

From the reservoir sites the annual summer flow of the Sacramento River can be increased during the latter part of the irrigation season by 1,541,020 acre feet. Liberated during the months of July, August and September, this water would increase the flow of the river more than 8,000 cubic feet per second. The low summer flow at Red Bluff is 4,000 second-feet.

By the flood of 1904, 682,000 acres were covered in the Sacramento and 115,000 in the San Joaquin valley.

On lowland and upland throughout the Sacramento valley, even without general irrigation, there is a great volume of agricultural production. The first irrigated fields are seen at Woodland, to the northwest of the city of Sacramento. Irrigation has been practiced there for thirty years and local capital has recently installed an elaborate system of ditches. Though there is a copious rainfall at Colusa, a supply of water is pumped from the river to irrigate orchards and alfalfa fields. At Willows there is a large canal that was begun with the intention of irrigating 156,500 acres under the Wright law, but owing to disagreement and litigation it was given up after forty miles had been constructed. A private corporation subsequently leased this canal, cut it through to the river and constructed laterals from which land is irrigated. Near Willows is the famous Glenn ranch, largest grain farm in the world.

Shasta, the most northerly county in the valley, produces a great deal of fruit of all kinds. It ranks third in the production of prunes. At Red Bluff, in Tehama county, is the Vina Vineyard, once the property of Senator Stanford, but now belonging to Stanford University, and, when it was planted, the largest vineyard in the world. In the vicinity of Biggs and Gridley there are 18,000 acres of irrigated land. There is irrigation about Chico from ditches and by pumping.

Rain is plenty at all these places.

At Thermalito are seen miles of fine orange groves.

Oroville, in Butte county, Palermo and Thermalito comprise the largest orange growing district of Northern California.

On the miles of lowlands along the river, the soil is of the world's richest and all sorts of vegetables and fruits are grown in the greatest profusion, potatoes and asparagus being especially important crops.

The Great Western Power Company's Big Project

ONE THOUSAND MEN AT WORK ON FEATHER RIVER BUILDING DAMS AND TUNNEL FOR PLANT THAT WILL IRRIGATE WIDE AREA OF LAND AND SUPPLY ELECTRICAL POWER

IT would seem that California was becoming too great a state, with its population of nearly 2,000,000 and the large enterprises that have grown up within it, to be affected visibly by any one new factor of development. There is one under way at the present time, however, that is so vast, so full of potentiality in the upbuilding of even as great a commonwealth as California, that it will have an immediate influence on the prosperity of the state. It will add wealth in such a signal manner that its advent will be an epoch in the state's history.

The Great Western Power Company is preparing to electrize California. It is carrying to completion in the Sierra a work that in magnitude will rank with the greatest of its kind in the world. This is an irrigation and power project that dwarfs nearly everything else of the kind known at the present time. It is second only to Niagara. Power enough will be furnished the northern and central parts of the state to make Fall Rivers and Sheffields of cities in that area and water enough to serve an acreage of land in several large counties that will add millions to the agricultural wealth of the state.

The work of constructing the mountain end of the mighty plant is under way with an army of men and the most efficacious hill-tearing and tunnel-driving mechanical contrivances known in this day of big engineering feats. It is expected that electricity and probably water will be supplied by the corporation next fall.

Electric Power and Irrigation.

The Great Western Power Company is capitalized for $25,000,000, with an authorized bond issue of that amount. It is a California corporation, with some of the most famous financiers of this coast and the East behind it. The president is Edwin Hawley, for many years prominently identified with the Southern Pacific Railway Company, and now a director and member of the Executive Committee of the Western Pacific Railroad Company. Mr. Hawley is also president of the Iowa Central and director of a large number of other railways in the West and Southwest. H. P. Wilson, of Brown Wilson & Co., of New York and San Francisco, financial agents of the Great Western Power Company, and who financed the project, is assistant to the president and auditor of the corporation. Guy C. Earl, who with E. T. Earl, of the Earl Fruit Company, of Los Angeles, originally purchased the property, is general counsel.

The first unit of the plant will produce 60,000 horse-power at the start, but it is being laid out for 120,000 horse-power, and ultimately the total of all units will reach 420,000. It will take several years to bring the entire project to completion, but an enormous voltage will be supplied at a near date.

Factory Wheels Will be Set Agoing.

The work now being carried on will result in a tunnel a little less than three miles long, with the enormous diameter of twenty feet, that will carry all the waters of a mountain river. From the trains, as they come down through the Sierra, travelers have seen the tremendous snowstorms that rage there in the winter. Over this mighty mountain range at higher altitudes, on slope and in canyons, this snow piles up to a great depth. Within it is a force, given freedom when the sun shines warmly, able to turn the wheels of a myriad factories. During the melting season ever canyon of the Sierra is a rushing torrent, and these streams, plunging onward, come together in many places, forming larger ones, which, growing greater as they flow, finally form rivers that carry enormous volumes of water to the great basin below, the Sacramento Valley. In the winter time the heavy rains, the fall being 100 inches on some of the watersheds, and the snows that melt on the lower levels maintain these rivers. Winter and summer there rushes down the gorges of the Sierra a tremendous bulk of water, attaining a fierce speed in some of the rock-walled conduits of nature.

It is this force, in the fastnesses of the Sierra, that the Great Western Power Company will apply to the making of electricity that will light cities and turn the wheels of manufacturing plants. It is this pure mountain water that it will bring down to the lands that need it. The largest electrical power development in the world, next to that of Niagara Falls, is what the world will have to wonder at when this project has been carried out.

Largest Storage Reservoir in the World.

The North Fork of the Feather River, a stream that races down through one of the gorges, carrying a large percentage of the water that pours from the Sierran watershed each year, is the scene of operations. Twenty years ago Dr. R. V. Pierce, of Buffalo, New York, constructed a tunnel at what is known as Big Bend to drain about fifteen miles of this river, that the gold in its bottom might be taken out. This tunnel is being extended 3500 feet by the big power company, and its interior diameter increased to twenty feet. It will be 15,000 feet long when finished. The tunnel will take all the water of the Feather River and make a fall at Island Bar of 520 feet, the water going through with terrific velocity. From this point the stored waters can be diverted from a system of canals and ditches to irrigate the large level bodies of land in Butte, Yuba, Sutter, Placer and Sacramento Counties.

Through the fertile lands that will be watered from the canals of this corporation the Western Pacific Railroad, which will be completed in the fall of next year, will pass. These lands, capable of the heaviest production of crops, including all sorts of deciduous and citrus fruits, have, because market transportation was lacking, lain dormant for years or have not returned the profit they should. The coming of water and a railroad at the same time will mean a great awakening in the region they occupy. All northern California will receive a great stimulus from the irrigation end of the enterprise.

Millions of dollars are being expended in the construction of dams to conserve the waters of the river, storage being necessary to maintain an adequate supply at all times for this giant enterprise. Power will be developed at several points. The company has acquired about 25,000 acres of land along the river for reservoir purposes. At Big Meadows the largest storage reservoir in the world, surpassing the enormous ones being constructed by the United States Reclamation Service, will be created. A continuous flow of water and uniformity of power throughout the year will be insured.

The hydro-electric power from the Feather River will be delivered within a year. It is to be supplemented and augmented by a large auxiliary steam plant in Oakland, on San Francisco Bay, to still further protect and facilitate manufacturing enterprise.

1—Western Pacific grade, Feather River Canyon. 2—Interior of tunnel extension. 3—Intake of Big Bend tunnel. 4—Work on Coffer Dam at Intake

Copper Cables on Steel Towers.

The transmission line itself will be a striking feature of the plant. The power is to be brought from the Big Bend drop on stranded copper cables, supported by steel towers at least sixty feet high and resting in concrete bases, insuring absolute safety and permanency of electric current. Everything is to be constructed in such a thorough and permanent manner that there can never be an interruption of the current. Factories will have a sufficient and unbroken supply of power.

The carrying of this vast supply of electrical force to northern and central California will give that region a thrill of life that it has never yet felt, though its advance has been rapid and wonderful. This new infusion of energy will send every city ahead. Under its stimulus California should become one of the greatest manufacturing states in the Union. The census of 1900 gave this state eleventh place in manufacturing industry. With the cheap power that is coming from the Feather River, the great supply of raw materials and the possibility of the distribution of manufactured products throughout the Orient and over the Pacific Coast, California should take fifth and probably fourth place.

The power will also be utilized for the development of many new industries. For instance, it will make possible the manufacturing of calcium carbide, aluminum and other products requiring a large amount of cheap power, which is not yet available in California because of the high price of fuel necessary to produce steam energy.

The new towns that will spring up along the line of the Western Pacific Railway, which is expected to bring a large influx of new settlers to the state, will also take advantage of this power, which will aid their growth materially. The irrigating of the land in the valley of the Sacramento will bring many new farmers.

Army of Men is at Work.

The description of the work shows the great magnitude of the engineering features. Construction is going on rapidly. The scene of the present operations has remarkably picturesque features, being in one of the most beautiful regions of these scenic mountains. Nearly 1000 men are at work boring and enlarging the tunnel and building the power house, new headgates and the impounding dams. Much of the work is being done on sites blasted out of the solid rock that forms the sides of the river canyon, and directly opposite the line of the Western Pacific, which, by following this gorge over a marvelous rock-floored roadbed, finds its way to the sea by a grade of less than one per cent.

The tunnel is being cut through solid rock and will be heavily concreted, insuring the full flow of the river without any disturbance of the plant by breakage or washing away of flumes or pipes, such as other power plants have suffered.

The Great Western Power Company has constructed here its own sawmills and installed a complete equipment, including a machine shop, boiler shop and air compressor. It has also established a hospital. Its force at this place is, in fact, a small, compact army, with every needed accessory, isolated in the mountains and amply equipped to successfully complete this engineering feat, one of the greatest of the century.

The company's capitalization of $25,000,000 is ample to provide the necessary money to develop the power and irrigation projects as rapidly as the growth of the country justifies. It is a work requiring some years for ultimate development, but it will eventually be one of the greatest irrigation projects in the West. The fertile country will be easy of access to market with the advent of the Western Pacific. Only water is needed to make this an immensely rich section. Irrigation and the coming of the railroad will give a great stimulus to the demand for lands.

San Jose (San Ho-say) and the Famous Santa Clara Valley

GREATEST FRUIT REGION IN CALIFORNIA, WHERE 130,000,000 POUNDS OF PRUNES ARE PRODUCED. CENTER OF HOMES AND EDUCATIONAL INSTITUTIONS, INCLUDING STANFORD UNIVERSITY

SANTA CLARA VALLEY, California, occupies the greater portion of Santa Clara county, which is near the geographical center of California. Its northern boundary is about thirty miles south of San Francisco, while San Francisco Bay bounds it on the northeast. Its eastern boundary is the summit of the Coast Range. The western boundary line is the crest of the Santa Cruz Mountains. The county tapers to a narrow gorge at the southern end, where the two ranges of mountains unite. Santa Clara Valley is thirty-four miles broad at the north and has an average width of fifteen miles. It is separated from the Pacific Ocean by one tier of counties, and the county seat is San Jose (pronounced San Ho-Say), which is fifty miles south of San Francisco.

San Jose postoffice (cost $250,000) with electric tower in background.

Encircling the level lands of the valley is a wide region of rolling hills, beyond which rise the mountains, culminating at the western side in Mt. Bache, 3,780 feet, and on the east in Mt. Hamilton, 4,250 feet. It is on this latter mountain that the famous Lick Observatory stands, at an elevation of 4,209 feet. It is one of the best equipped astronomical observatories in the world. The large telescope has a thirty-six inch lens and because of the favorable condition of the atmosphere the best results are obtained.

From this point a grand view may be had, looking out over the entire valley. San Francisco may be seen, more than fifty miles distant, while on San Francisco Bay the steamers are visible.

On account of Santa Clara county's location with reference to prevailing winds and ocean currents, its climate is favorably affected, rendering it pleasantly cool in summer and warm in winter. The average winter temperature is about fifty degrees and in summer seventy degrees. It is preeminently the horticultural county of California, and produces more prunes, cherries, peaches, apricots, pears and other deciduous fruits and vegetables than any other county in the state.

Of the total area it is estimated that 800,000 acres are suitable for cultivation of fruits and vines. Of these something more than 250,000 acres are in Santa Clara valley and 300,000 in the foothills. The roads are excellent and make all points easily accessible. More than 300 miles of these roads are sprinkled during the summer months. Three lines of railroads connect the county with the outside world and electric car systems extend throughout it. Its population is about 100,000, and San Jose has a population, including the suburbs, of 57,820.

Santa Clara county is the greatest educational center in the State of California. The educational interests are represented by the Leland Stanford, Jr., University, the Santa Clara College, the University of the Pacific, the College of Notre Dame, King's Conservatory of Music, the State Normal School, public schools of all grades, together with numerous private seminaries, business colleges and institutions for special educational work. In the public school system there are eight high schools and 104 grammar and primary schools.

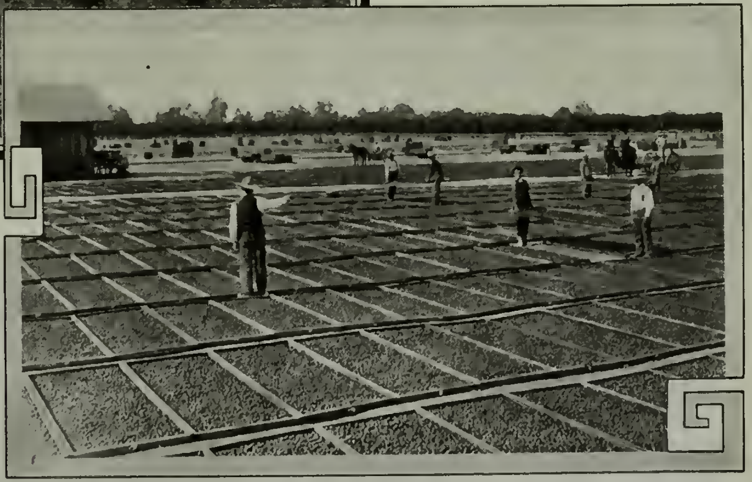
Orchard home in the Santa Clara Valley.

The soil in the valley and foothills is productive beyond description and along the foothills, at an elevation of from 400 to 1200 feet, there is what is termed the "thermal belt," which is generally, and in some localities wholly, free from frost. The Santa Clara Valley has a semi-tropic climate. The palm trees, blue grass, alfalfa, and various varieties of vegetation, roses and flowers in general, thrive throughout the year. The soil in the valley is a sedimentary deposit, easily cultivated, requiring but little irrigation and producing every variety of fruit and vegetable common to California, while an endless variety of trees, palms and shrubbery from tropical climates have been introduced into this valley with success. The more elevated portions are well adapted to fruits and grapes.

So wide is the divergence in the character of soil in different localities in Santa Clara Co. that agriculturists are reluctant to express opinions as to comparative merits, each section having demonstrated its fitness for growing some of the almost endless varieties of fruits and vines, which are cultivated at handsome profits.

The valley is drained by a number of streams. In summer these water courses diminish greatly, and the smaller ones wholly disappear. Having their sources in the surrounding hills, and sinking as they approach the valley, they augment the subterranean supply of the artesian wells. All over the valley wells may be found, usually from 60 to 100 feet deep, though some find a larger and more permanent supply at a much greater depth. Flowing artesian wells may be secured through the eastern and middle sections of the valley. In other portions the water is raised by windmills into tanks, furnishing an ample supply for household and gardening purposes, while steam or gas pumps will furnish an endless supply for irrigating the farms, although many crops are raised without irrigation.

Every variety of fruit grown in California is produced in Santa Clara County, but the chief of all its horticultural pursuits is prune growing. This county produces two-thirds of the prune crop of the state. Last year the crop was 130,000,000 pounds of dried prunes.


Drying prunes in the open air. 25,000 trays of fruit are on the ground.

The largest fruit canneries in the world are operated at San Jose, the leading city of the county. The output for the last year was 900,000 cases, estimated value, $2,500,000.

San Jose is located in the heart of the valley and is a metropolis. It has seven banks. The bank clearings average $2,500,000 per month, while the annual bank deposits are $50,000,000. Three railroad systems and three electric systems center at San Jose and radiate to all portions of the valley and state.

The United States records of the Weather Bureau at San Jose show that there were from September, 1905, to September, 1906, 245 clear days, 61 partly cloudy, and 59 cloudy. The record for the same months of 1906-07 shows 199 clear days, 71 partly cloudy, 95 cloudy. The average rainfall ranges from 16 to 20 inches and the precipitation is usually between November and April. The rainfall for 1906-07 was 22.35

under. The reports of the United States Government at Washington on the percentages of sunshine for the Pacific Coast are as follows: Seattle, Washington, 40 per cent; Portland, Oregon, 45 per cent; San Francisco, 57 per cent; San Diego, 60 per cent; Los Angeles, 65 per cent; and San Jose, 65 per cent. This indicates the character of the climate in Santa Clara Valley.

This is a delightful section for men of families to establish their homes in. Twenty acres will amply support a family and make them independent. Information and booklet describing Santa Clara county and San Jose will be forwarded free by addressing the San Jose Chamber of Commerce, San Jose, California, Jos. T. Brooks, Secretary.

Magic of San Joaquin, Water Supply Held in Sierra

By J. M. [illegible], Secretary Stockton Chamber of Commerce

The glint of the midsummer sun on the snow-capped Sierra evolves the magic which energizes the great San Joaquin Valley. The agricultural realm of this broad basin is threefold more extensive than the cultivated portion of the Nile Valley in Egypt, which for untold centuries has been the theme of historians and economists because of its fruitfulness. Yet within many portions of the San Joaquin Valley, irrigation united with skilled husbandry, has yielded results more wonderful than any authenticated output of an equal area in the storied Valley of the Nile. Out of this new realm of production, equal in area to the five states of Delaware, Massachusetts, Connecticut, New Hampshire and New Jersey, are destined to come the choicest fruits and vegetables on which eighty millions of Americans will rely for wholesome food.

From the melting snows of the Sierra comes the energy which has made Fresno the raisin center of the Western Continent, which has raised Porterville to rivalship with Southern California in citrus fruit production, which in Merced has worked marvels at the Buhach plantation, which has given Turlock and Modesto the finest irrigation system in the world, and which in the delta of the San Joaquin has so intensified the production of asparagus, onions, potatoes, beans and other vegetables that under present methods the output of 5000 acres of land, is equal in value to the best output of 100,000 acres in the area of grain raising.

Whole Valley to Be Irrigated.

There is no question that the whole area of the San Joaquin Valley will in a few years, at least within a generation, be brought under the influence of irrigation and will be almost exclusively devoted to the production of the choicest food products that enter into the consumption of the people of America and Europe.

The grain fields and pastures that once extended over the entire valley are gradually giving way to small farms industriously cultivated by resident farmers and owners who are building homes that are attractive and thus creating demands for the comforts and conveniences of life. Capital must take giant strides in order to supply them. The 32,000 square miles of the San Joaquin basin constitute one of the most resourceful regions of the American Continent. This area is endowed with a climate agreeable to the residents and favorable to the production of all of the products of the temperate and warm zones. It is fortunately supplied through the agency of the Sierra with abundant water with which to revive the semi-arid lands and permit a continuous and profitable utilization of the entire valley.

In the raisin district of Fresno may be found a mighty output which in value will equal that of any other like area devoted to agriculture on the earth's surface. This is due directly to the agency of water.

Oak-clad foothills along Kaweah River, Tulare County, Cal. This is a great orange county.

In the county of Stanislaus there has been developed one of the most extensive, complete and economical irrigation systems known in the world. The agriculturists of that county are provided with an inexhaustible source from which to derive livelihood and profit. But it is in San Joaquin county, the gateway of the great valley, where perhaps irrigation has been developed and practiced by the most diverse methods. While irrigation companies have utilized the waters of the Mokelumne and Stanislaus rivers to supply the needs of 150,000 acres, the most extensive irrigation in the county is that of the reclaimed or tule lands in the San Joaquin delta which are irrigated by the simple process of culverts from the San Joaquin river, which through its various channels forms an unfailing supply, and which is at a higher level than the adjacent lands.

Irrigating Delta Lands Easy.

The problem here is to merely convey the water through the gate or culvert in the levee or by a siphon over the levee to the lands which are lower than the level of the river. Most of the 200,000 acres of delta land which are under cultivation, are now irrigated by this method, not by flooding, but by means of ditches as the water seeps through the porous peat land latterly without difficulty. It is here that the most surprising results in the production of agricultural staples have been noted and vast areas devoted to vegetables such as onions, asparagus, potatoes and beans, have paid high profits amounting to many times the interest on the price of the lands.

In this part of the San Joaquin Valley as in the other portions there is no absolute dependence on the natural water courses for irrigation, as every stratum of soil has its source of water constantly supplied from the melting snows in the high mountains and it is only necessary to sink wells from 100 to 300 feet deep and to supply them with pumps in order to give an abundant supply of water for irrigation. The water in the well will rise in almost every instance within 15 or 25 feet of the surface, and many agriculturists consider it more economical and more independent to develop their own water supply than to depend on the services of an irrigation company. This is particularly true of small holders engaged in the production of vegetables for the market.

Around Stockton on the heavy lands the Italian gardeners have developed one of the most extensive systems of truck farming to be found on the Pacific Coast, and have depended for irrigation almost entirely on the agency of windmills and gasoline engines, raising water from subterranean sources.

Nature Prodigal in Blessings.

For the production of grain and fruits the rainfall in the lower San Joaquin Valley is abundant to meet all demands and few growers resort to irrigation to produce vineyards or orchards, though for berry culture the benefits of water are generally conceded in practice. On most lands it is ncessary to irrigate for alfalfa and it is the practice to irrigate the land after each cutting of the crop. Some of the vineyardists of the county and a few of the orchardists have seen fit to assist nature by the application of water but generally it is believed that thorough cultivation is an excellent substitute, where the water level is so near the surface that moisture is within the reach of all ordinary trees and vines.

Nature has been most prodigal of its blessings in this mighty plain. It raised the Sierra to the clouds that it might arrest, hold and seasonably distribute the moisture which drifted in from the Pacific. It provided 250 days in each year of warm sunshine that the constantly melting snow might feed water courses which carried the alluvium and silt of the mountains to fill up the broad plain. The sunshine through countless ages, stimulated vegetable growth, and the decay of the latter enriched the floor of the valley with a vegetable mold. Now the era of utilization has begun, and under the engineering devices of civilized man the alchemy of water and sunshine are applied to furnish the Western World with the choicest foods, the finest beverages, the highest comforts.

The Valleys of the Euphrates, Ganges, Indus, Nile, Yangtsekiang and Amazon, have played their parts in the world's progress in supplying cheap food products to multitudes of savage or half-savage people whose wants were few. The San Joaquin Valley, a realm of equal fertility, has a higher destiny. Its development in the twentieth century will be designed to cater to the varied desires of the highest civilization of the period. Its tillage will be scientific. Its residents will be intelligent and prosperous. Its market will be the world. Its magic will be irrigation.

Stanislaus County One of the World's Garden Places

WITHIN FIVE YEARS, UNDER AMPLE WATER SUPPLY, DUST-BLOWN PLAINS ARE TRANSFORMED INTO ORCHARDS, VINEYARDS, ALFALFA FIELDS AND VEGETABLE PATCHES

CALIFORNIA is the greatest irrigation State in the Union and Stanislaus is among the greatest irrigation counties in California.

At the La Grange dam on the Tuolumne River there is diverted sufficient water to cover the lands of the Modesto and Turlock Irrigation District, embracing 258,210 acres.

The district irrigated from the headworks at La Grange lies right in the center of this rich county, which, because of its beautiful climate is known as "Sunny Stanislaus."

The water was developed under the Wright law, a measure introduced by a legislator of that name, which permits the establishment of irrigating systems by bonding the land.

There is no better exposition of irrigation in its highest form in all the world than is given in this productive county of central California. There is no better proof of the axiomatic statement that irrigation will be found profitable in the end, no matter what discouragements are undergone in securing it, than the history of reclamation in Stanislaus gives. Through bitter litigation, dissensions and predictions of failure the plan of watering these lands was carried along. No where else were the vicissitudes greater or the final triumph more complete than in this county.

Full Vindication After Vicissitudes.

Though the Wright law, under which this irrigation has been carried out, was passed by the California Legislature twenty years ago, and the two districts organized under it immediately afterward, the litigation delayed matters so that water was not delivered to any land until five years ago. The Turlock District has been served for five years and the Modesto District only three.

The results achieved in this delightful section in that short time are an object lesson. There is already there a thorough demonstration of the highest use man can make of rich soil under a favorable climate, with water.

Under the law permitting the organization of farmers, the districts were given such ordinary powers of municipal corporations as were necessary for the watering of the lands. Each district is governed by a body of five directors, elected by the qualified voters within it. These boards appoint the necessary subordinate officers and provide for the maintenance and management of the districts. Bonds were issued for the expense of construction and an assessment was levied upon all the land, each acre paying its proportion, to pay the interest on the bonds and for the maintenance and operation of the systems. Each owner of land has an equal right in the water. The average cost of it is 75 cents an acre per year.

Though separate organizations, the two districts take their water from a common source and are usually spoken of in conjunction. They cooperate and virtually constitute one irrigation district.

Wheat is No Longer King.

Before irrigation came, wheat and stock raising were the two great industries all over Stanislaus County. Wheat is still grown with profit on the areas not irrigated, but wherever there is water, the farmers have almost forsaken cereals for the more profitable irrigation crops. Where it may take 300 acres to make any money from cereals, from ten to twenty-five will return heavy profits in the watered places. Beside there were years when there was not enough rainfall to raise even wheat. The rain precipitation is only about twelve inches in Stanislaus, which gives it the many cloudless days from which it takes its name of "Sunny Stanislaus." The rain falls only between the months of October and May and at wide intervals. There are no thunder storms or high winds.

The diversion dam for this irrigation system is 129 feet high. It is 336 feet wide at the crest and is constructed of masonry 91 feet thick. It sits in a narrow gorge of the Tuolumne River canyon and raises the water high enough to send it out at a proper grade into the canals, one on each side of the river. The Modesto District has 132 miles of canals and laterals and the Turlock District 154 miles. The main canal of the latter district is one of the largest constructed, being seventy-four feet wide at the bottom. The other is sixty-two feet wide. The dam cost $550,000 and the entire system $2,500,000, or about $10 an acre. Each main canal carries water about twenty-two miles before reaching the irrigated land. Of the total area covered 82,000 acres is in the Modesto and 176,210 acres in the Turlock District. All permanent improvements of later years have been destined to carry 1500 cubic feet

per second in the Turlock and 750 feet in the Modesto District canals. This is more than sufficient to irrigate all the lands embraced. Fortunately, the Tuolumne is at its highest point during the summer months, when water is used the most. The average annual discharge of the river at La Grange, including the amount diverted to the canals, is 2580 cubic feet per second, and the average yearly discharge 1,860,000 acre feet. The irrigating season extends from February to October. There is more water to be had than is needed, even in the driest season.

Settlers Come From Everywhere.

Settlers have been moving in upon this tract from all parts of the Union since the water came and there is lively development, but with all this there is plenty of land left that is to be had at comparatively low prices. To this time there has been actually brought under water in the two districts 55,000 acres. There are about 37,000 acres that are not for sale at all. The rest can be purchased and it is being taken up rapidly by farmers that observe the profitable cultivating of the adjoining lands. There is an abundance of water for it all.

The land under these systems is level and easily checked and tilled. It is all cleared, having been devoted to wheat growing before the water came. The soil is a light sandy loam, mostly, with 5 or 6 per cent of clay and about 20 per cent of other fine material. It readily absorbs water and holds it satisfactorily. It is very productive. The subsoil is for the most part remarkably deep. The roots of the alfalfa plant have been known to penetrate to a depth of thirty feet. It is a sediment soil, as is that of the entire San Joaquin Valley, near the northern, or lower end of which—the San Joaquin river flows north—Stanislaus is located.

There is splendid natural drainage for this irrigated section. The Stanislaus River flows on the north, the Merced on the south and the San Joaquin on the west, while the Tuolumne cuts through it. There is some productive bottom land on these rivers, but nothing that could be called marsh land. The entire irrigated district is high and dry, except for the water of the canals and the light rainfall, the oak being about the only tree that nature placed on the uplands. It is one of the most healthful regions in the world. Tide water is only forty miles away and a cool breeze, carrying the ocean salt, brings a coolness in the evenings of the warmest days of summer. These warm days ripen the crops for the early market. As in the rest of California, the heat is dry and never oppressive.

One of the products of the Modesto-Turlock region.

Diversified Farming the Rule.

Diversified farming is the rule in the Modesto-Turlock section. With the fruits and vines the farmer plants his tomatoes, potatoes, beans and other garden truck and while he is waiting for the trees to produce, takes off the "short crop," which helps pay his farming expenses and the cost of living. He feeds alfalfa to his cows and the by-products of the dairy to the hogs. With all this he can not only keep his farm running, but lays away money in the bank. This is said to be about the only locality that will support a man and his family the first year from the products of the farm. The raising of chickens, turkeys and ducks helps out in this.

These lands in Stanislaus grow about everything worth while. Oranges ripen earlier there than in the southern part of the state, lemons and the Pomelo, or grape fruit likewise, and the quality is the finest.

Alfalfa produces four and five crops a year of from one and a half to two tons to the acre in this

One of the main canals in Stanislaus County, Cal.

county, where it is thoroughly at home. If seeded there in the fall, it will give two cuttings of from a ton to a ton and a half during the following spring and summer. The following season it will give five cuttings. From seven to ten tons an acre a year is counted on. All sorts of livestock thrive upon it.

Alfalfa has sent Stanislaus from twelfth to the fourth place among the counties of California in the dairy industry in only four years. This forage plant and the attendant establishing of creameries constituted the first development in these districts and it has grown with wonderful rapidity. Creameries have been established at Modesto, Turlock and Ceres and buyers from cities outside secure much of the product of the herds. In 1906, according to the figures of the State Dairy Bureau, Stanislaus produced 2,759,582 pounds of butter. During the winter of 1906-7 the dairymen received from 32 to 47 1-2 cents a pound for butter fat, the average receipts per cow ranging from $8 to $15. This county has an abundance of green feed the whole year.

Showing how irrigated lands produce in Stanislaus.

Smyrna Figs and Grapes.

Skimmed milk and alfalfa produce fine hogs and these sell readily at 7 cents a pound. Chickens and turkeys also do well in the alfalfa fields.

The Smyrna fig is being planted extensively in the Modesto-Turlock District. The owners of fig orchards look for big profits from them. Near Ceres is one orchard of 500 acres. Two crops a year are borne by the trees at six years, and it is thought they will pay about $500 an acre. The Smyrna is the fig of commerce and is sold as a confection all over the world. The very finest are produced in this section. They will not ripen and cure where there are fall fogs or early rains.

Grape culture is rapidly becoming an important industry. Many vineyards have been planted throughout the two districts and some have come into bearing. Three-year-old vines yielded from five to ten tons an acre last year, which brought from $15 to $18 a ton. A four-year-old vineyard of Thompson seedless grapes had a $10,000 crop on it this year. All the finest varieties of table grapes produce splendidly.

This section is a sweet-potato center. The yield is heavy and the price from $1 to $1.50 a sack. Some fabulous returns have been received from them. Cantaloupes give the grower $200 an acre. Egyptian corn pays $50 an acre and beans bring heavy returns. About $600 an acre is made from strawberries. All the other berries and all sorts of vegetables yield in profusion.

Of course all the deciduous fruits produced are grown in perfection and in great quantity in this district, as Stanislaus has been for years one of the great centers of fruit production.

Two transcontinental railroads, the Southern Pacific and the Santa Fe, penetrate this section and the Western Pacific will tap it. There are several smaller roads and the Tuolumne and the San Joaquin Rivers are navigable six months in the year.

Noted West Side Region.

There is in Stanislaus County what is known as the West Side region, lying between the San Joaquin River and the Coast Range. The land is so fertile there, and so easily worked, that, though crops may be obtained only once in three years, farmers grow rich raising grain. Here is room for one of the finest projects the government could take up under the Reclamation Act. For seventy five miles there is a level stretch of gently-sloping and productive land, with a river running its whole length, yet only the upper end is irrigated and only a limited area of that. Not only could canals be dug, but much land could be irrigated by pumping from the San Joaquin with plants like those at Williston, North Dakota, or at Garden City, Kansas.

There are thriving towns in Stanislaus. Modesto, the county seat, has 4000 people and is a beautiful little city, growing rapidly. Turlock has jumped from 200 to 800 in a very short time and has 2500 persons within a short radius around it. Oakdale is also the center of an irrigated district, though a small one, and has about 1200 people. Newman at the upper end of the west side has nearly 1000 people. Salida, Denair, Hickman, Wesley, Ceres, and Knights Ferry, the orange center, are all good towns.

Great Dam in Colorado.

The *Engineering News* states that what the projectors call the largest earth dam ever built is to be undertaken at Standley Lake, about nine miles northwest of Denver, Colo., by the Denver Reservoir Irrigation Company. The dam will be 1¼ miles in length and 150 feet in height and will thus be a far larger structure than the proposed Gatun dam at Panama. It will have a concrete core wall. The lake formed behind it will cover about 2000 acres and will store about 5,000,000,000 cubic feet of water, enough for the irrigation of over 100,000 acres of land lying below it. The new dam will be constructed by the hydraulic fill method. About 8,000,000 cubic yards will be required in the construction, the dam being between 700 and 800 feet wide at the base. Construction will be commenced soon.

Rice hulls—sometimes found in bran shipped from the Southern States—are deadly to all domestic animals. The hulls are not like barley or wheat hulls in bran, which are bad enough, but the rice hulls contain particles of silicate that lodge or cut into the digestive tract causing pain and often death.

Horse shoeing is to be included among the courses of instruction of the Colorado Agricultural College.

Two carloads of hogs fattened on Spanish peanuts were recently sold at six cents per pound at Cameron, Tex.

Fall.

Oh, apple time and cider time,
And time of pumpkin pies,
Of stubblefields and naked trees
Of clear and cloudless skies;
Of babies jacketed and warm
With dancing curls and feet
And red, red cheeks and glinting eyes
In every nook and street.

And harvest moon and mockbird songs,
And fieldlark's roundelay;
And goldenrod and heather-bloom,
And thistledown at play;
And amber-colored morns and eves,
And hazy nights and still;
And the sad call at eventide
Of lonesome whippoorwill.

Migrating birds have all gone south
But still the copses ring,
And still the mocking bird sings loud
The songs he used to sing;
And the late morning glories bloom,
And roses everywhere
Their perfumes and their petals fling
Like broidered scarfs and rare.

The hazy time, the lazy time,
The coaxy time of year;
Of dusty time and short'ning days
And nights of autumn cheer;
Take down the fiddle and the bow
And wake an old time tune
To autumn's cheer and winter near,
And the round harvest moon.

—The Houston Post.

IRRIGATION IN SOUTHERN CALIFORNIA

The subject of irrigation is a bugbear to a majority of Eastern farmers. There is a settled idea among them, which it is very difficult to remove, that the necessity for irrigation is a drawback. This, however, is quite a mistake. It is not necessary to tell anyone who has resided in California, even for a brief period, of the benefits of irrigation. They are too manifest. Land that was worth 50 cents an acre has, by the expenditure of from $10 to $20 an acre, in the construction of irrigation works, become worth $250 per acre and more, while flourishing cities have sprung up where twenty years ago the coyote roamed among the sagebrush and cactus.

The fact is, that the artificial supply of water in arid regions is an advantage. The water supply can be regulated, and when the true needs of each cultivated plant shall have been discovered a uniform maximum of productiveness will be attained, such as is not possible in a region whose water comes directly in the form of rain.

Fruit growing is not the only industry that is benefited by irrigation. The desirable points of a more certain crop and of a larger yield are just as certainly secured with corn and alfalfa as with oranges and apricots. Stock raising is greatly benefited by irrigation, as pastures are kept green and fresh, and great crops of hay are produced. Alfalfa, the great forage crop of this section, is made to give five to eight cuttings in a season, which aggregate a tonnage that it would be impossible to secure under ordinary conditions. Almost every product known to our agriculture will not only yield more, but will give greater returns above the cost of production.

One of the greatest proofs of the value of irrigation lies in the fact that no farmer who has once practiced it would willingly go to farming in a district where he would have to depend on the natural rainfall. He knows that the labors of half a year will not be rendered fruitless because of a week's drought. The farmer in an irrigated region does not have to wait for rain in order to plow, to sow or to cultivate. He has the elements and the seasons practically under his control.

In some cases, water is sold outright with the land, where the settler only has to pay a nominal price for the expense of keeping the ditches in order. In other cases, where water is not purchased with the land, a charge averaging $5 an acre per year is made for it. Land with water, of course, brings a much higher price than land to which no water supply is attached.

Not All Lands Irrigated.

A mistaken idea has prevailed to some extent among people in the East that farming is only carried on in Southern California by means of irrigation, and that without it crops would be a failure. For all small grains and winter crops irrigation is not employed. They are cultivated just as they are in the Mississippi Valley or the Atlantic states, and need only the regular rains of the winter and spring or wet season to mature them. Corn, however, which is a summer crop, planted after the rains are over, is in many sections irrigated, yet in many other sections the natural moisture of the soil is sufficient to mature the crop without irrigation; upon many of the lands, after a winter sown crop, raised without irrigation, has been harvested, another crop is raised when the rains are over, by means of irrigation, and thus the land does double duty.

In many places land will be seen which is never free from a growing crop from year to year, except during the few days when plowing for the new planting. Where water from the rivers is used, the sediment held in suspension constantly renews the fertility of the soil over which it is spread. There are sandy lands about Los Angeles which have now been cropped for three-quarters of a century, with no apparent diminution of fertility. Water is also spread to a great extent in the great orchards and vineyards in the uplands and the foothills. It is found that a limited quantity of water, given at the time when fruit is swelling, makes a better quality, yet it is used with discretion, as too much injures the quality. The tendency is year by year to the use of less water, it being found that with thorough cultivation the ground retains its moisture so well that irrigation is, upon many of these lands, unnecessary, and upon others, less needed. In many sections are large bodies of moist lowlands, called by the Spanish *cienegas*, and extending often for miles, which are natural pasture lands, green all the year round. These are found to be especially adapted to dairying and are with each year more and more devoted to that purpose. Such lands generally lie near the sea and have the benefit of the heavy sea of fogs at night through the summer and the cool ocean winds during the day. The same lands are adapted to the cultivation of corn and the northern fruits, such as the apple and the pear.

Sources of Water Supply.

Water for irrigation is obtained from the rivers, and from the small mountain streams and from artesian wells. On the lowlands flowing wells are obtained from depths varying from seventy-five to two or three hundred feet. They are bored by machinery and piped with iron, and are quickly and cheaply made. In many of the apparently dry mountain ravines and canyons submerged dams are put in at favorable points, forcing the underground flow of water to the surface. In other places tunnels are run at a slight slope until bedrock is reached and the stream tapped and brought to the surface. In some localities extensive storage reservoirs are constructed. In the open valleys windmills are used by the thousands for pumping water for household and garden use.

No work has yet been done in Southern California under the National Irrigation Act. The leading private irrigation systems of Southern California are that under the Bear Valley dam, a large lake in the mountains of the San Bernardino county, which supplies the flourishing orange-growing settlement of Redlands, that supplied by the Hemet dam, in the San Jacinto mountains, with immense storage capacity, supplying the fertile Hemet Valley, and the one under the great Sweetwater dam in San Diego county. The horticultural settlements of Riverside and Pomona are furnished by artesian wells. A great amount of water has been developed through artesian wells, during the past two years.

This article would be incomplete without a reference to the great enterprise for bringing mountain water from the snow-clad slopes of Mount Whitney, the highest mountain in the United States, to Los Angeles, a distance of over 200 miles. For this, bonds to the amount of $23,000,000 were recently voted by the citizens of Los Angeles. After furnishing an ample water supply, and developing nearly 100,000 horse-power, this water will give a great surplus for the irrigation of a large territory surrounding Los Angeles.

Public Exhibition of the Wonderful Pneumatic Dredger

A PUBLIC exhibition was given in Sacramento a few weeks ago of the Pneumatic Pipe Dredger, recently brought to perfection by ingenious inventors of that city and to promote which a stock company formed of prominent men of that city has been formed. The statement that a dredger, working on a pneumatic principle that would do things no other machine of that nature could perform—lift twice as much earth or sand a far greater height and at half the expense of the old system—had aroused a great deal of curiosity and in consequence there was a large throng present when the public test took place.

The working of the new dredger brought out all the commendation that had been expected and the men that understood such things went away realizing that the pneumatic invention marked a new era in dredging operations that would soon leave the old style of doing such work among the things of the past. The new machine did everything that its inventors had said it would do. Men like M. A. Nurse, chief engineer of the Commission of Public Works; Hon. M. R. Beard, Mayor of Sacramento; John F. Armstrong, Register of the United States Land Office, and Nathaniel Ellery, State Commissioner of Highways, expressed their astonishment at the wonderful work done through such a simple process as that under which the new machine operates. They prophesied that it would be the dredge of the future and bring about marvels in all works of reclamation, excavation, mining and other processes where dredgers are called into service.

Solves Reclamation Problem.

Amongst the great throng that saw the first test were merchants, bankers, engineers, farmers, officials of state and county, professional men, mine owners, and expert machinists. The simple and efficient work of the new invention impressed them all with the belief that a great step had been made toward reducing the cost of operations in which this sort of machine is employed, besides adding rapidity.

The opinion was expressed by men learned in such matters that the pneumatic dredger they had seen at work was the solution of the problem of reclamation in the Sacramento and San Joaquin valleys. The great cost and difficulty of this work will be reduced to a minimum and the pneumatic dredger will permit of its being prosecuted without restriction.

In full the name of the new machine is the Bedrock Pneumatic Pipe Dredger. The marvel of it lies in the wonderfully simple and inexpensive method of operation and the novelty of its performance. Instead of sucking up sand from the surface of the river bed, as does the ordinary surface dredger, or bringing it up in buckets or shovels, the pipe through which the material is lifted and discharged "jets" its way through the sand under the stream to bedrock and raises the material from there, or from any point between the river bottom and bedrock desired by the engineer. Thus any stratum may be "tapped" without the necessity of handling that above or below it.

Is the Limit of Simplicity.

The plan of operation is the limit of simplicity, which gives an added value to the machine, as it reduces the danger of breakdowns to a minimum, or eliminates it altogether, and makes the expense of repair trivial. The sand is lifted through the discharge pipe by the use of compressed air and water, which are forced from above down several small pipes surrounding the large central discharge pipe, into a mixing chamber. The resulting mixture of compressed air and water is then discharged from below into the larger pipe and creates a vacuum at the bottom of the pipe, with the result that the surrounding sand is drawn into the vacuum and forced up through the pipe to a height unattainable in any other form of dredger.

During the test referred to, weekly public exhibitions of the machine have been given since—that all might have a chance to inspect its workings thoroughly—the material raised was more than 40 per cent sand, and the number of cubic yards lifted per hour was many times greater than any other type of dredger known could have brought up.

The initial test of the new dredger took place at the Twelfth street bridge in the Capitol City. The handful of Sacramento business men that financed the construction of this first machine had kept quiet about their plans until they had been completed. When they became assured that the dredger was everything the inventors had claimed for it, they prepared for the demonstration and issued invitations. The river steamer Weitchpec carried the throng to the scene of the test and also supplied vital energy from her own pulsing body to the machine that was waiting on the river bank. Steam connections were made between the dredge and the Weitchpec's boilers. While this was being done all those in the party were given the fullest freedom in the inspection of the mechanism of the dredger. Those familiar with such machines were struck at once by the simplicity of this one and some expressed doubts as to its efficacy. Even the men that did not know a piece of machinery from a potato could readily grasp the method of operation of the pneumatic dredge. All there was to be seen in the way of machinery was a winch, an air compressor, a water pump, and a long pipe with conical base. The pipe was suspended in a high derrick and its top was connected with the air compressor and pump by several lengths of rubber hose.

Crowd Cheers Its Operations.

Without difficulty the pipe was driven down through eighteen feet of sand and, after hesitating a moment at a stratum of "hard pan," it broke through this and reached a total depth of thirty-five feet below the bed of the river. There it was stopped and the discharge jets turned on.

Cheers rose from the spectators when the discharge pipe began to spout diluted sand and earth to its full capacity. It took three men to bring the flexible tube at the end of the pipe under control and insert it into the thirty-inch sluice-box. The only difficulty encountered was the choking of this sluice-box because of the great percentage of sand raised.

A demonstration of what could be expected of the dredger in the way of levee building was made by turning the discharge onto the river bank. The result had an amusing effect on the old river men present, who showed excitement in watching the operation. They declared enthusiastically that this machine would do more for the protection of their homes than all the other devices that had been tried in levee construction during the last thirty years. This enthusiasm was not all caused by the tremendous capacity of the pneumatic dredger to throw up the material, and to any height needed. The river farmers saw that it would elevate just the material necessary in the various stages of levee work. Coarse sand and gravel, they observed, could be brought up from one stratum for the foundations and the lighter silt for the covering from another. They saw that at a cost trifling as compared with the vast sums spent on such work in the past, a chain of these dredgers could be put in operation along the rivers for the building of embankments and reclaiming of lands and the permanent deepening of the channels, restoring navigation to the standard of 1849, when steamboats plied regularly to points above Marysville.

Opens Way for Hydraulicking.

An interesting feature of this exhibition was the panning by the mining men present of the gravel brought up from the bedrock of the old channel at the thirty-six foot level. Every pan showed colors. The men that hunt for gold realized that in this new invention their hope of some day getting at this ancient bedrock in a practical manner would be fulfilled. Operations of this nature have been impracticable heretofore because of the filling of the river with silt from hydraulicking and the inability of the old-style dredger to reach the stratum desired. Without the discouraging and usually prohibitory expense of removing the intervening yards of valueless sand and boulders, the pipe of the pneumatic dredgers will pierce directly to the stratum overlying the old bedrock and bring up the gold-bearing sand and gravel.

From 1849 to 1882, when Judge Sawyer issued the order restraining hydraulic mining, $2,000,000,000 in gold were recovered by this process. That is but inconsiderable in comparison with what is left. The pneumatic dredger will probably cause a revival of this industry, as it will render the removal of silt from the restraining dams rapid and inexpensive. With a cheap and rapid way to take out these deposits of silt and place them where there can be no washing down upon the farmers' lands, hydraulicking can be resumed.

It is estimated that one of these dredgers, costing less than $25,000, will raise 10,000 cubic yards of sand a day to any height required and deposit it where wanted.

As soon as sufficient stock is sold, the manufacture of these pneumatic pipe dredgers will be begun on an extensive scale at Sacramento. The company will also operate many of them, as the profit from that is large. The capital stock is being offered at a low rate to the numerous subscribers. It should be worth a great deal when the plant is in full operation, and, in fact, has been raising materially already. The character of the men behind the enterprise is a guarantee to the buyer of the stock. Prospective purchasers are asked to make the fullest investigation.

Stock Being Sold Cheap.

"The machine will do the work; the work is waiting to be done; the prices are high enough to guarantee a handsome profit, and the management will be competent and conservative," is what the prospectus of this company, which seems to have wealth within its grasp, says.

The new dredger is a combination of the principles used in the "air lift," the "hydraulic ram," the "ejector," and the "sand sucker." It is a positive revolution in dredging methods, yet there is nothing experimental about it—nothing that has not been used time and time again in other fields of operation. In forcing its way down to bedrock, the same process that has been used for years in pile driving, that of a water jet under pressure, opening a path for the pile, is employed. A vacuum created in the dredge pipe causes it to suck up the loosened material.

The recent disastrous floods in the Sacramento Valley have made capital anxious for an invention that could throw up permanent levees to a great height at small expense.

This pneumatic dredger can dig deeper, lift higher and place its load at a greater distance than any other machine. It can build a levee of any height or shape. It can distribute evenly over the surface to any desired depth, enabling the landowner to make heavy soil over into one of lighter consistency, or to bring light tule soil to a strong condition, and it does away with the necessity of a scraper in leveling a field.

The company is capitalized for $1,000,000, with shares of a par value of $1. All stock is non-assessable and fully paid. There is no personal responsibility of stockholders.

A postal card with name and address sent to the Pneumatic Dredge Company, Oschner Building, Sacramento, California, or a personal call, will bring the whole matter before anyone interested.

To Enlarge Assouan Dam.

The Assouan dam across the Nile having developed no weakness during the few years of its operation and the benefits of its construction having been effectively demonstrated, the Egyptian government has decided to increase its height by twenty-two feet, which will be the means of increasing the amount of water impounded by two and a half times.

This improvement will afford facilities for irrigating nearly 1,000,000 acres in the Nile Valley, in addition to that which has already been fertilized by this great engineering project, and it is estimated that the increased revenues of the cotton crop alone resulting from the proposed improvement will be considerably over $15,000,000.

The work of making this addition to the dam will consume six years and the cost will be about $7,500,000 including damages for land appropriated by reason of the extension of the basin.—Wichita *Eagle*.

Treaties are Necessary.

Other countries having an interest in the waters that flow through the United States and into them, the making of treaties has been necessary in the work of carrying out the reclamation plan. One with Mexico, relative to the water of the Rio Grande, has already been signed and a commission has been appointed to draw one up with that republic relative to the flow of the Colorado. Canada must be considered in the matter of the Milk river in Montana, and negotiations have already been opened with that country looking toward an amicable adjustment.

COLORADO PROJECT

Gunnison Tunnel is a Daring and Marvelous Work

BORE SIX MILES LONG IS BEING MADE FROM GORGE THROUGH MOUNTAIN RANGE TO TAKE WATERS OF RIVER TO UNCOMPAHGRE PROJECT IN VALLEY

THE United States Reclamation Service purposes to irrigate the Uncompahgre Valley, in Western Colorado, by the diversion of the waters of the Gunnison River.

The completion of the task will require the construction of a series of tunnels and canals which in many respects will have no precedents in irrigation construction.

The Uncompahgre Valley is separated from the Gunnison River by the Vernal Mesa, a mountain mass rising 8700 feet above sea level. Through this mesa the Gunnison River has cut one of the most stupendous canyons in all nature. For a distance of over sixty miles the river runs through a mighty gorge, the walls rising in almost perpendicular cliffs to heights of 2000 feet above the river bed. So unbroken are the cliffs that the river is reached in two places only by horse trails, and in most portions of the canyon access on foot is extremely difficult.

It was seen at once that the only feasible method for the diversion of the Gunnison River was to tunnel Vernal Mesa and thus draw the waters from the rock-bound river to the fertile but arid valley. After careful investigation a tunnel route was selected, having a length of 30,582 feet from portal to portal. Having selected the tunnel route, the remaining work consisted of locating the canal to carry the water from the tunnel to the Uncompahgre River, in the valley, and the location of the series of canals to conduct the water from the Uncompahgre River to the tracts to be irrigated.

Great Tunnel through Mountain Range.

THE Uncompahgre Project consists, then, of the following units:

1. The Gunnison Tunnel of 125 square feet cross-section, six miles in length, lined throughout with concrete masonry, having a carrying capacity of 1300 cubic feet of water per second. It is estimated that the tunnel will be finished late in 1908, or early in 1909.

2. The South Canal, designed to carry the waters from the Gunnison Tunnel to the Uncompahgre River. This canal is twelve miles in length. It contains numerous artificial falls or drops, massively built of concrete, passes under four ridges through short tunnels and discharges into the Uncompahgre River at a point high enough to permit the irrigation of practically all the lands in the Uncompahgre Valley. This canal will furnish numerous power sites, capable of developing an aggregate of about 10,000 horse-power. The canal was finished in the fall of 1907, and is ready for use whenever the water runs from the tunnel.

3. The West canal, designed to water the lands lying on the left-hand bank of the Uncompahgre River. This canal will be some thirty miles in length, and will irrigate a large tract of new country heretofore above all canals and ditches. It will also carry supplemental supplies to such existing canals as decide to participate in the benefits of the new work. The irrigable land lying under this system is approximately 65,000 acres in extent, and consists mainly of high-grade fruit land.

4. The East canals, consisting of a series of canals designed to irrigate the lands lying on the right-hand bank of the Uncompahgre River. At the present time this area is poorly supplied with irrigation facilities. The intention is to build such new canals as may be needed, and in case existing canals comply with the requirements of the government to enlarge them and to utilize their rights of way to the fullest capacity. Under the East canals will be found an area of approximately 80,000 acres of high-grade land, varying from sandy adobe to pure adobe. The entire tract is of exceptional fertility, well adapted to the culture of alfalfa, grain, potatoes and sugar beets.

The town of River Portal, Colorado. The school house is the highest building in the right hand background.

In the final development of the project an intricate and expensive system of laterals and distributing canals will be necessary. Under normal development these will be added as the necessities demand.

Dangers and Difficulties Encountered.

The construction forces on the Uncompahgre Project have encountered and overcome some very serious obstacles, particularly in driving the Gunnison Tunnel.

At the outset the failure of the contractor for the tunnel work compelled the government officials to take over the work and carry it on under direct supervision.

As the bore has advanced one serious obstacle after another has delayed the work. On seven different occasions the workmen have been driven from the heading by floods of water, originating in crevices cut by the tunnel. In July, 1905, a seam of inflammable gas was tapped in the west heading. In December, 1906, a flow of water, amounting to 25,000,000 gallons each twenty-four hours, was tapped. This flow of water carried with it an enormous volume of carbon dioxide, or "choke damp," as designated by coal miners. This condition compelled the abandonment of the work for four months and the sinking of a ventilating shaft 700 feet deep.

At intervals enormous beds of fossils have been excavated. From start to finish the work has been beset by treacherous ground which required the most careful timbering to prevent accident.

The story of the exploration survey and construction of the Gunnison Tunnel and the Uncompahgre Project will be an entertaining one so long as men enjoy the recital of the details of persistent and courageous labor for the accomplishment of desirable results. But the goal is the end of the game, and we may well leave the consideration of the engineering features of this project to take up the characteristics of the empire which is to be brought under the plow.

The Uncompahgre Project lies in southwestern Colorado, in approximately the same latitude as San Francisco, St. Louis, Cincinnati and Washington. The altitude varies from 6200 feet at the southern extremity of the Project to 4800 feet at the northern extremity.

The land to be irrigated lies in a strip approximately thirty miles long by ten miles wide. The Uncompahgre River, which follows the long axis, divides the tract into approximately equal parts. The Denver & Rio Grande Railroad parallels the Uncompahgre River throughout the Project.

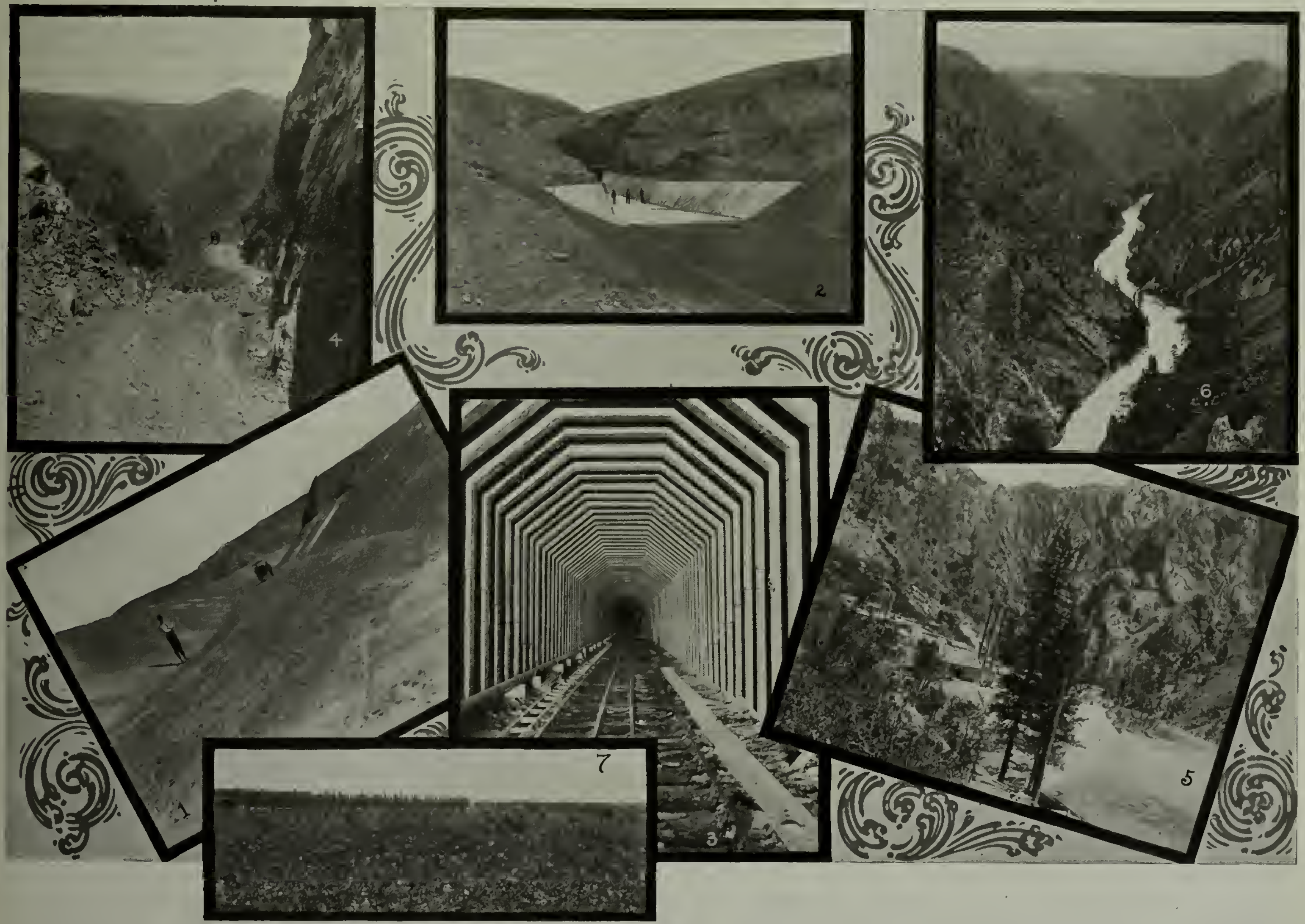
The climate of the Uncompahgre Valley can not be excelled. It is a sunny climate, the number of days in the year when the sun is not visible being very few. It is related that one hotelkeeper of the early days made a standing offer of free board to his guests on every day on which the sun was not visible during the day.

The precipitation of moisture averages about nine inches per annum, the greater part of which falls as snow during the winter months.

Rain water is not depended upon at all for crop culture, consequently there is no such thing as a crop failure from vagaries of the weather, except as the variations of the seasons in the mountains produce more or less water in the streams. The variations in the mountain snowfall are well understood and the effect discounted at the beginning of each crop season.

Flood Water to be Utilized.

Heretofore all irrigation has been carried on from the waters of the Uncompahgre River. This stream is capable of the successful irrigation of about 25,000 acres of land. Its floodwaters have never been utilized, however, to their full extent, and it is one of the best features of the new work that the facilities provided will doubtless supply adequate carrying capacity to utilize all the floods from the Uncompahgre.



1—Completed portion of South Canal, looking north from station 104. Uncompahgre Project, June 30, 1905. 2--No. 509 Uncompahgre Project, Colorado, South Canal between reservoir and tunnel No. 4, E. E. Sands, May, 1907. 3---No. 402 Uncompahgre Project, Colorado. View showing the timbering in the west end of the Gunnison tunnel, Colorado, W. J. Lubken, July 3, 1905. 4---View looking down the Gunnison Canyon from the newly completed Canyon Road, ½ mile west of the East Portal of the Gunnison Tunnel, Colo., showing a part of the completed Canyon Road entering the east end of the tunnel; Uncompahgre Valley Project, July 2, 1905. 5---Power plant in Gunnison Canyon from east portal of tunnel, Uncompahgre Project, Colo. 6---Looking up canyon from point 600 feet up hill from tunnel heading, Uncompahgre Project. 7---Young Peach Orchard with potatoes between rows on Cohenfelter Ranch 2½ miles west of Montrose, Uncompahgre Project, Colo.

In low-water season and in years when floods are small the Gunnison River will supply an ample flow for the needs of the country.

The soil of the Uncompahgre Valley may be divided into three distinct classes:

1. The black loams of the Uncompahgre River bottom. This soil is limited in area to about 3000 acres. It is very rich, grows any commodity adapted to the climate and is especially adapted to the production of special crops, such as celery, onions, cabbage, etc.

2. The red soils, which make up the bulk of the area west of the Uncompahgre River. This soil consists of an adobe base, into which a large proportion of sand and gravel has been washed from the surrounding ridges. This soil is light, warm and porous. It is especially adapted to fruit raising, but it will also raise enormous crops of alfalfa, grain, sugar beets, potatoes, etc.

3. The adobe soils, which constitute about one-third the total area of the Project. They are composed of the decomposed shales of the carboniferous period. The soils are gray in color, heavier and colder than the red soils, but carry an inexhaustible supply of plant food. They are especially adapted to alfalfa, grain, potatoes and sugar beets.

The Uncompahgre Valley, which formed a portion of the Ute Indian Reserve, was opened for settlement in 1881. In the succeeding years the farmers who have lived in the valley have demonstrated that the soils and conditions are adapted to practically any kind of crops that can be grown in the rain belt in similar latitudes and that the conditions are especially adapted to certain other products.

The crops which do best are apples, peaches, plums, apricots, prunes, wheat, oats, barley, rye, alfalfa, sugar beets and potatoes.

In the production of fruits the Uncompahgre Valley is the equal of any district in the world, and it is doubtful if there are three other districts in the United States which can compare with it. Its apples are world-renowned for color, flavor and keeping qualities. Its peaches are sold all over the United States at the top of the market, while its packed fruits may be found in the principal markets of every civilized country on the globe. Where so much has been accomplished upon such a limited area and under adverse circumstances it requires no stretch of the imagination to believe that with abundant water and a large area under cultivation this section will one day rival the famous fruit-growing sections of California, Washington and New York.

Living Conditions of the Finest.

Orchards which return a net income of ten per cent upon $1500 per acre are numerous. Potatoes and sugar beets produce yields which justify prices of $200 per acre or more, and it is axiomatic that any piece of land which has a water right attached and which will produce two crops of alfalfa is worth $100 or more per acre.

Living conditions in the Uncompahgre Valley are ideal. The sunny days produce a mean temperature above the normal, while the altitude and the nearby mountains give a delightful coolness to the air, particularly at night, which renders medium weight clothing comfortable throughout the summer.

On account of the arid conditions sultry days are unknown. Catarrh, hay fever and kindred troubles are rare and can be escaped altogether by a short stay in the mountains during the critical season.

Good schools are to be found in every district, and churches of every denomination hold regular services in their own buildings in the towns. The State of Colorado is well provided with higher institutions of learning, the State Agricultural College in particular being one of the leading institutions of that character in the world. To the dweller in the humid regions, accustomed to rain, snow, sleet and wind storms, the delightful climate of the Uncompahgre Valley will offer an irresistible charm. Like all new countries, the improvements leave much to be desired in the way of public comforts, but one may live in a tent the year through with much less discomfort than attends residence in well-built houses in the humid states.

Not the least of the attractions of the Uncompahgre Valley is the magnificent scenery in which it is placed. Whatever may be said of the commercial value of beautiful scenes, the fact remains that breadth of vision, greatness of soul, keenness of intellect, are cultivated and enlarged by an appreciation of the grand and the beautiful in nature.

The Uncompahgre Valley is surrounded on all sides by the mountain ranges which make up a portion of the continental divide. Their snow-capped peaks, fragrant forests, crystal lakes and trout streams constitute a grand playground in which healthful pleasures may be indulged in at a minimum expense.

1

Street scene in Montrose, Colorado.

2

Street Scene in Montrose, Colorado.

The lands of the Uncompahgre Valley are partly in private ownership and partly in the public domain. The acreage in the public domain is open to settlement under the Homestead Act, subject to the terms of the Reclamation Act, which require that the settler shall live upon the land five years, have one-half his entry under cultivation, and return to the Reclamation Fund his proportionate part of the cost of the irrigation works.

Of the land in private ownership approximately 25,000 acres are under cultivation. These lands can still be purchased at reasonable prices, varying according to locality, quality and opportunity for early irrigation.

Cost From $30 to $35 per Acre.

The present indications point to a probable cost for the irrigation works now under construction by the government of $30 to $35 per acre, payable in ten annual installments without interest. This means that people who can acquire lands at reasonable prices can secure a water right from the government, and in a few years be in possession of holdings which will represent values ranging from $100 to $1500 per acre, according to the use to which the land is put. Concerning this statement there can be no argument. The present generation will exhaust every acre of free land in the United States, and when the immense population of the future looks around for homes it will find that they must be purchased of the people of this generation who are wise enough to go in and possess the land. Not only this, but all subsistence must come from the land, and the farmer of today who sells his holdings cheaply, or who abandons his calling for the pursuits of professional or commercial life, is leaving a business which is just entering upon its true prosperity. Twenty years hence the landowner will control the destinies of the country, and no stress of circumstances can take his prosperity from him if he be of sound judgment and diligent.

The Uncompahgre Project holds out welcoming arms to all who seek homes.

Montrose, Central City of the Fertile Uncompahgre Valley

Montrose and its Prospects.

The great Gunnison Tunnel is located but a few miles to the east of the city of Montrose, the center of the large tract of land that is to be irrigated. The western end of the tunnel debouches almost into the backyard of Montrose. The Gunnison Tunnel will be a sight for world tourists when it is completed, and Montrose will be the place where they will leave the train to make the inspection.

At the rate Montrose is going ahead under the impetus already given it by the irrigation project, as it nears completion, its citizens believe it will easily double its present population of 4000 in the next three years. The development that the placing of an ample supply of water on the miles of rich lands surrounding it, and that which will come from the cheap electric power to be generated, should more than do this. It has been predicted by men in the government service that Montrose, with all its new advantages, will have 15,000 people before the end of a decade.

The land in the Uncompahgre Valley that is to be irrigated lies in the shape of a triangle, the base resting along the Gunnison River, and is about sixteen miles in length. The Denver & Rio Grande Railroad traverses the Project from end to end, so that points in the irrigated section most remote from the railway are only eight miles from it. Montrose is on this railroad and has a position that commands the whole area. Montrose is the largest city in the valley. It is located 352 miles southwest of Denver. This city is also the point from which railroad communication is had with the great gold and silver mining camps of the San Juan Mountains. A branch of the Denver & Rio Grande runs from Montrose to the mining section. This region, where the precious metals are being taken from the earth in great quantities under a yearly increasing development, provides one of the very best markets for the products, from hay to fruit, of the Uncompahgre Valley, and, because of being the railroad junction, Montrose will always be the supply depot for it. It is an important addition to her various markets in other directions.

Land Proven to be Fertile.

When the government experts decided that the land of the Uncompahgre Valley were rich they did not have to depend upon scientific tests alone. There was practical demonstration to guide them. For twenty years about 20,000 acres of land about Montrose had been farmed, with a very inadequate water supply. Even with the handicap, each year brought some remarkable yields of various crops, including fruit after the trees had come into bearing. It is history in the valley that one apple tree produced one season $25 worth of fruit. One forty-acre orchard netted $7000 in one season. From a forty-acre wheat field 3600 bushels were obtained one year, an average of ninety bushels to the acre.

The citizens of Montrose claim the sugar beet record for this valley, and the results from the cultivation of this valuable saccharine vegetable are certainly remarkable. It is stated that from seven-eighths of an acre thirty-five tons of beets were produced in a season. They were sold at the nearest switch at $5 a ton f. o. b. From forty acres 800 tons of beets were harvested, an average of twenty tons to the acre.

3

Threshing wheat that goes 60 bushels to the acre, near Montrose, Colo.

The land of Montrose County seems to be splendidly adapted to the cultivation of potatoes. As high as 725 bushels of marketable potatoes to the acre have been grown there. Some individual tubers among those grown weighed as high as six pounds. The quality is excellent and the highest prices are obtained for them. These potatoes are being shipped to many places throughout the world. The potatoes are remarkably smooth, free from any hollow and of fine keeping quality.

Alfalfa, sometimes called "the corn of the West," is grown abundantly there. The yield is given as from three to five tons to the acre, and three crops are cut each year. Its remarkable value as a food plant for live stock is well known. Its great fattening qualities cause it to be used a great deal in rounding out sheep and cattle for the market. Stock are brought in from the ranges and finished up on this hay, which puts them in a condition to bring fancy prices.

Alfalfa to feed the Herds.

The stock-raising industry has been carried on with much profit for years about Montrose, and with the extending of the alfalfa fields it will become still more important. The wide summer ranges maintain thousands of head of sheep and cattle. The breeding of blood horses is being given more attention each year. Montrose County produced the carload of yearlings that won the sweepstakes prize at the international stock show in Chicago in 1905. Hogs and poultry do as well there as any place known.

Alfalfa is said to produce the finest honey known, it being of delicious flavor, perfectly clear, unusually sweet and free from a certain suggestion of acridness that eastern honey has. The climate in the Montrose region suits the honey bees and they thrive and work industriously there, storing up the best that the alfalfa fields furnish.

All sorts of deciduous fruits are grown with great success about Montrose. Apples, especially, it is said at Montrose, bring higher prices than those of almost any other region, because of their unusual excellence. They are firm and juicy and of superior color and flavor. Peaches of the finest are produced, also cherries, apricots and plums. Berries and vegetables of all sorts grow profusely.

Land values are now at their lowest in the Montrose country. The prices range from the raw land at $15 an acre to the highly improved orchard and vegetable acreage, which has sold in some instances for as much as $500 an acre. Good land can be had from private owners for in the neighborhood of $50. This is unimproved, and the settler must prepare it for planting and irrigation, which is not expensive if he uses his own labor. The price mentioned does not include the water right. This will be probably $35 an acre, payable—as under all the other projects—in ten annual installments. Under this project these installments will be $3.50 an acre each year.

Coal and Oil are Found.

Coal and oil are being developed about Montrose, and supplies of these two fuel products are expected to be valuable aids to the growth of the city. Coal veins are numerous in this section. Many have been found in the surrounding mountains. As the need arises they will be developed. In the sinking of the oil well that is going down a mile from the city a blanket vein of coking coal nine feet in thickness was encountered.

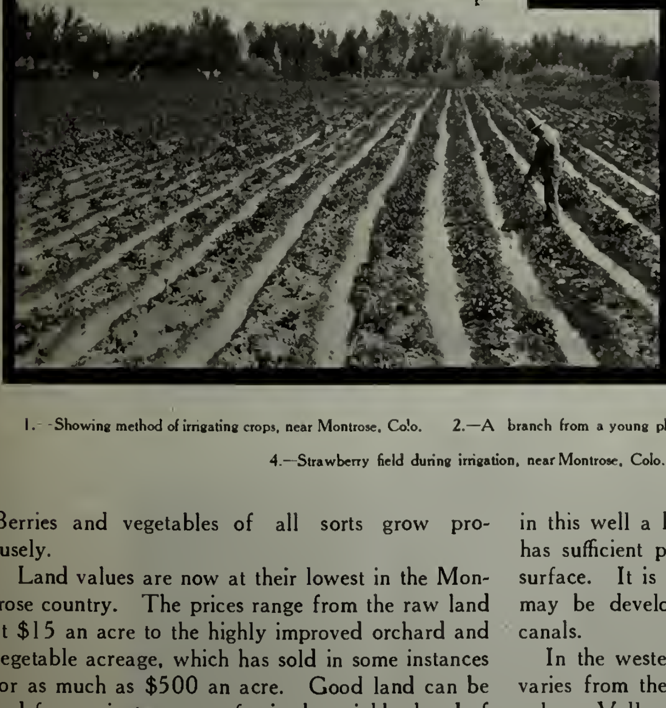
In the oil well referred to a depth of 1200 feet has been reached and several small flows of oil have been met with. There has also been tapped in this well a heavy flow of artesian water, which has sufficient pressure to rise many feet above the surface. It is possible that valuable artesian flows may be developed on lands not reached by the canals.

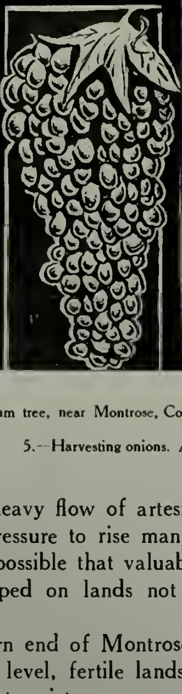
In the western end of Montrose County, which varies from the level, fertile lands of the Uncompahgre Valley to picturesque mountain country, there is one of the most promising mining regions in Colorado, including gold, silver, copper and uranium. With railroad facilities—which it is expected will be provided through the awakening the coming of irrigation will inspire—this would be one of the greatest copper-producing localities in the United States, as well as a gold and silver mining center.

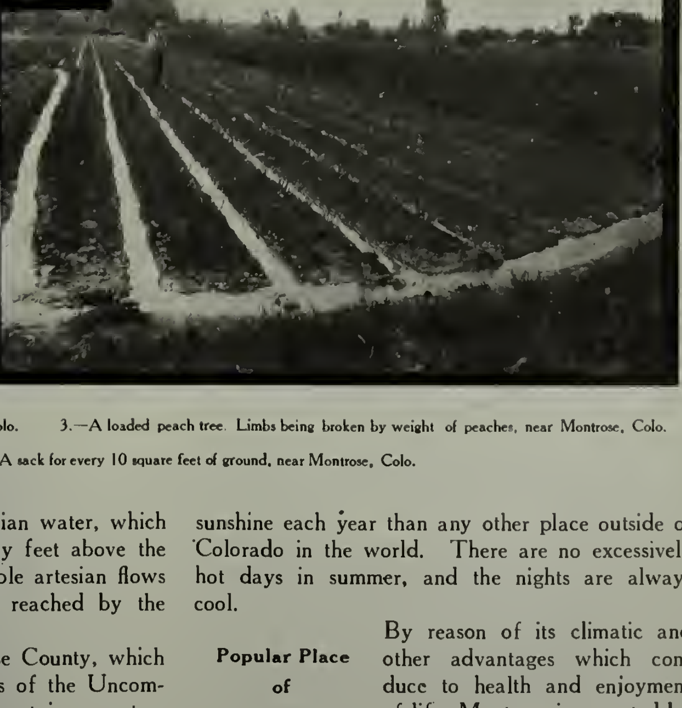
The altitude of Montrose is 5813 feet above sea level. It has a mild climate, with open winters, the thermometer rarely dropping to ten degrees below in the severest seasons. In common with other Colorado points, Montrose boasts more days of sunshine each year than any other place outside of Colorado in the world. There are no excessively hot days in summer, and the nights are always cool.

Popular Place of Residence.

By reason of its climatic and other advantages which conduce to health and enjoyment of life, Montrose is expected by its citizens to become eventually one of the most popular residence towns in the West. It has many inducements to offer for those that wish to establish a home where the real zest of living will prevail. The invigorating atmosphere, pure water, fine food products and picturesque sur-







1.—Showing method of irrigating crops, near Montrose, Colo. 2.—A branch from a young plum tree, near Montrose, Colo. 3.—A loaded peach tree. Limbs being broken by weight of peaches, near Montrose, Colo. 4.—Strawberry field during irrigation, near Montrose, Colo. 5.—Harvesting onions. A sack for every 10 square feet of ground, near Montrose, Colo.

roundings are what the people depend upon to draw homeseekers.

The pretty city by the Uncompahgre is becoming a resort of those suffering with rheumatism and kindred afflictions, as it has artesian waters that possess great curative powers over these diseases. A sanitarium would pay at this point. The curative qualities of the waters, combined with those of the air and sunshine, should draw many patients.

This growing metropolis of a great garden and orchard region is providing in the matter of educational facilities, as would be expected in such a community. The city has a graded school employing fifteen teachers. With this is connected a well-equipped manual training school. The Montrose County High School also is located at the metropolis. This is an accredited school, its graduates being received without examination into the best colleges and the state educational institutions. Plans are being made to keep up with the rapid growth of the city by establishing new schools as fast as the increase in population makes them necessary.

Churches of several denominations are represented with pretty edifices. There are libraries, also. The various fraternal organizations are represented by prosperous lodges. There are three newspapers in the city.

Banking Business Shows Prosperity.

The banking business shows a healthy and prosperous state of affairs. The merchants are all doing a good business. There are many very handsome stores. They carry complete stocks.

Montrose has the advantage, besides being the metropolis of the Uncompahgre Valley, of being the seat of government of Montrose County. It has a substantial courthouse and other public buildings. The government has erected there an elegant structure for the headquarters of the Reclamation Service in that district. The United States Land Office is also there, and all filings on government land under the Uncompahgre Project must be made in that city. The United States Circuit and District Courts are held there.

Investors will be interested in the opportunities offered by Montrose. There are many chances to embark in business, and manufacturing in several lines would pay well. The Montrose Commercial Association is keeping all inquirers posted on these and other matters, and is sending out valuable data to all those who write for it. There is certainly room for a large beet sugar factory, for the remarkable yields of beets already mentioned and the fact that the farmers expect to make much of their money out of this crop insure a supply of material. A cannery and an evaporating plant are also needed there. The cheap power will be an aid to the manufacturer.

Montrose has just completed a fine water works system at a cost of $95,000. This supplies the city with the purest of mountain water for domestic and fire extinguishing purposes. The city is electrically lighted.

Real estate investment in this city is very attractive. Values have trebled and in some cases quadrupled in the last four years and are still advancing. Bank deposits have increased one hundred per cent in two years, and the receipts of the Montrose postoffice have increased over twenty-nine per cent in three years.

Predicts Rise in Lands.

The Constructing Engineer of the Uncompahgre Project said in a public address in Denver last January that land values were increasing rapidly and many improvements being made. He told of a man that had sold his land in Grand Valley for $1200 an acre and invested near Montrose. That man, he prophesied, would sell his holdings for more per acre in ten years, when he had the water right, than he got for the piece he had sold.

The engineer called attention to the thirty-five prizes that Montrose took at the St. Louis World's Fair for agricultural products and of prizes taken at other places for fat or blood stock. He said, also:

Its apples and peaches go into every market at top price, and men that have the facilities and skill to raise them are growing wealthy from orchards of apricots, plums, prunes and cherries.

I estimate the present value of the Uncompahgre Valley, neglecting anticipated increases due to the Government work, at $250,000 per annum. Five years after the Government projects begin to deliver water to the lands I estimate the value of that valley at not less than $15,000,000. Ten years from the date of completion of the work I estimate the value at $30,000,000 and the income from the lands at from $3,000,000 to $5,000,000 per annum. I look for the establishment of beet sugar works, canneries, strawboard works, cement and plaster mills, small woolen mills, packing houses, distilleries, breweries and a wide variety of manufacturing industries.

The Gunnison Tunnel

STUPENDOUS UNDERTAKING CAUSES WONDER ON PART OF VISITING AUSTRALIAN.

An Australian journalist, recently on a visit to America, went to view the work on the Gunnison tunnel of the Uncompahgre project. He was so impressed with what he saw there that on his way to his native land he called at the editorial rooms of ORCHARD AND FARM and wrote a description of the work, from which the following is taken:

The construction of the Gunnison tunnel, to take the water from a river that has heretofore been safe in the depths of a rock cleft of its own making and turn it upon a large valley, six miles away, is a work worthy of Roman emperors or the builders of the pyramids.

Between the valley and the Gunnison river is a mountain known as Vernal Mesa. It is a mountain of rock and clays and shales and offers about every possible hindrance to boring; besides there are reservoirs contained within its interior that gush floods of water when tapped, and deadly gases flow in seams in some places. Shelving and caving formations are a constant menace.

The Uncompahgre Valley, to which the water is to be taken, was once the home of the Ute Indians, but now some of it is farmed and there are prosperous towns within it. The Indians looked upon Vernal Mesa and the foaming river that flew on its way far down in the gorge—2000 feet below the crest—with superstition and there are many legends connected with mountain and river.

No Indian would have ever thought that the waters of the Gunnison would some day be brought to the Uncompahgre Valley. Scarcely anyone else ever thought so and when the United States Reclamation Service announced that it was going to perform this feat, developments were awaited with interest.

And now that tunnel, big enough for a railroad train to pass through and which is to carry water sufficient for nearly 150,000 acres of land is nearing completion. The engineers have met with all sorts of obstacles on the way. One of the hardest tasks was that of taking measurements and mapping the gorge. Two men of the service distinguished themselves for bravery in this work. A. L. Fellows and W. W. Torrence embarked in a raft at a point where they could make a descent into the abyss. They were away several days, and it was feared they had been killed, but finally they came up far below, on the only trail that led down to the stream, with the necessary data in oilskin bags. Their work showed the building of the tunnel to be feasible.

First of all a road had to be cut down the precipitous sides of the dangerous gorge to the site of operations on the river side. This was accomplished at great expense. Some of it had to be cut out of the rock, and it was all difficult of construction. Over this, machinery and supplies were hauled and the work began. It has been carried on through thrilling experiences. Six men were killed by caving masses, gas has driven others from the bore, water has almost drowned some, one crew escaping on one occasion when a sudden flow had covered the floor of the tunnel to their waists. There was a mile of solid rock to go through on the river end of the tunnel. Some of this was so hard that from twelve to twenty-four hours were required to drill a round of blast holes in the tunnel's face.

Beds of giant fossil shells, some of them four feet in diameter, were encountered. These were a menace to the workman as they shifted in masses, loosening the shale and threatening to bring down tons of debris.

Private contractors essayed this tunnel, but gave it up and the government had to take full charge. Despite the obstacles, a record of speed in tunnel building is being made.

Work is going on from both the valley and the river end of the tunnel and two towns have sprung up at these portals. Each contains several hundred people, with commodious buildings for the reclamation service and neat homes for the workmen. They have excellent sanitary systems with inspectors and are policed and electrically lighted. That in the gorge is known as River Portal and is a picturesque place. The one on the edge of the valley is Lujane. Work is proceeding from four headings beside the portals.

One hundred electrical horsepower is used in ventilating the tunnel. Constant care must be employed to suck the deadly vapors from it. Pumping of water goes on constantly and the water must be carried a long distance. Every carload of material taken out has to be hauled two miles to the dump. An electrically operated tramway is used. Sometimes in Heading No. 4 it has been necessary to handle 700,000 gallons of water in twenty-four hours.

This tunnel beneath the mountain will be six miles long—30,583 feet exactly—and its dimensions known as the cross-section, 10½ by 11½ feet. Its floor will be concrete. The timbering is massive and will endure for years.

Country once as dry as the desert cactus fields that has been reclaimed.

Idaho Projects

The Payette-Boise Project of Immense Scope

SAGEBRUSH AREA EMBRACING 300,000 ACRES OF FINEST LAND TO BE WATERED, BESIDES 70,000 ACRES THAT ARE ALREADY TILLED

IDAHO has been found a prolific field for the efforts of the United States Reclamation Service. That State is virtually in the midst of a boom from the results of arid land irrigation. The total of lands upon which water has already been led or for which the work of reclamation is under way runs into the hundreds of thousands of acres and the various tracts are situated in many parts of the State. Private enterprise, too, is finding a profitable field of endeavor in reclamation work, as evidenced particularly in the rich Mountain Home district.

1.—Enlarged section New York Canal, Oct. 3, 1906. Payette-Boise Project.
2.—Boise River dam looking west on axis of dam, Aug. 9, 1906. Payette-Boise Project.
3.—Lower Deer Flat embankment, showing gravel on lower face and method of hauling, placing and spreading, March 20, 1907.

Under the impetus of this great reclamation work, thousands of new settlers are pouring into the State and establishing themselves on productive farm units. As crops are unfailing and there are ready markets in the great mining, timber and livestock regions for the products of the farms, money is plentiful and a wave of great business prosperity has spread over the State. The assurance of crops every year tends to put cash in the pockets of all the producers. Consequently there is little credit asked anywhere and the result is a ready money business that creates great activity and results in the making of money quickly.

Several of the more fortunately located young cities, which will be mentioned extensively further on, have felt the influence of this wave of advance and are growing by bounds. Comfortable fortunes have already been and are being made by those locating in them, both in business ventures and in real estate speculation. Town realty has made some big jumps and the further development of their tributary country and the extension of these towns promises to create a still greater advance in the near future.

Of the several reclamation projects in Idaho, national and private, though all of them are of the first importance, that known as the Payette-Boise project is the most extensive. It is one of the largest being put through by the government, both as to magnitude of works and area to be watered.

Service will be given 300,000 acres and 70,000 acres in private ownership and $7,000,000 will be expended.

Many Towns Have Growth Accelerated.

Under the general plan the water of the Payette river will be diverted by a dam at the Black Rock Canyon, five miles above Emmett. From this source about 95,000 acres will be irrigated by gravity canals. Of this, 35,000 acres lie in the Payette Valley and the remainder in the lower Boise Valley. The canal crosses the divide connecting the two valleys in a cut sixty feet deep. A canal will be taken out on the north side of the Boise river, near the line of the Farmers Union canal to cover lands on the north side of the Boise river not served by the Payette. Important towns in Canyon County draw from these lands. Immense reservoirs at Payette Lakes will insure a constant supply of water. Great storage works can be developed there at nominal expense.

The lands between the Boise and the Snake river, which are also tributary to Canyon county towns, the most important being Nampa and Caldwell, will be watered by a canal of great magnitude, taken from the river just above the line of the present New York canal. This big waterway will add to the cultivation of the land already being farmed and will reclaim about 200,000 acres more of desert land.

A mammoth reservoir at Deer Flat will be the principal feature of the irrigation works on the south side of the Boise. This is a natural site, lying about five miles south of Caldwell and covering about 10,000 acres. The reservoir will be about sixty feet deep and the water supply will be sufficient to irrigate all the land tributary to the reservoir with a full season's water right. The distributing arteries from the reservoir will cover all the area on the south side of the Boise from Nampa down, including the major portion of the Pioneer Irrigation District.

Two more reservoirs at the headwaters of the Boise are included in the project. They will serve lands above the Deer Flat reservoir. With the relief for the Lower Boise lands from the Payette river, all land in the project will receive a full supply of water.

A pumping auxiliary feature is embraced in this undertaking. There is a tract of 15,000 acres lying on the south side of the Snake river, across from Caldwell, that is to be irrigated by pumping from the Snake river and by conserving the flow of Sucker Creek. The lift will be from 60 to 90 feet.

Some Big Dams on Project.

The work now under way includes a diversion dam in Boise river, just above Boise. It is built of masonry, as are all the government structures of this sort, and will be enduring. A diversion canal forty feet wide on the bottom and with a capacity of 75,000 inches extends from the diversion dam to Indian Creek in the vicinity of Kuna on the Oregon Short Line Railroad, a distance of about twenty-four miles. The water is then turned down Indian Creek, a distance of eight miles and carried by a canal of the same capacity twelve miles to the Deer Flat reservoir.

One of the largest dams known in reclamation work is being put in at Deer Flat. This structure is rising at the lower end of the site. It is 7,000 feet long and fifty feet high. It will contain a million yards of material—clay and gravel. The finishing work is being done on it as this time.

Another tremendous dam is closing a second outlet to this giant reclamation cup. It will not be as long as the one already described, but will be seventy feet high and contain more material—1,050,000 yards. No contracts have been let for this piece of construction, but the government is doing it directly. It is excavating the material with two seventy-ton steam shovels. The laterals for distribution of water have been surveyed.

This artificial lake created by the United States in the Idaho mountains will have a shore line of twenty-seven miles and a depth of from twenty to sixty feet. Its capacity will be 186,000 acre feet of water.

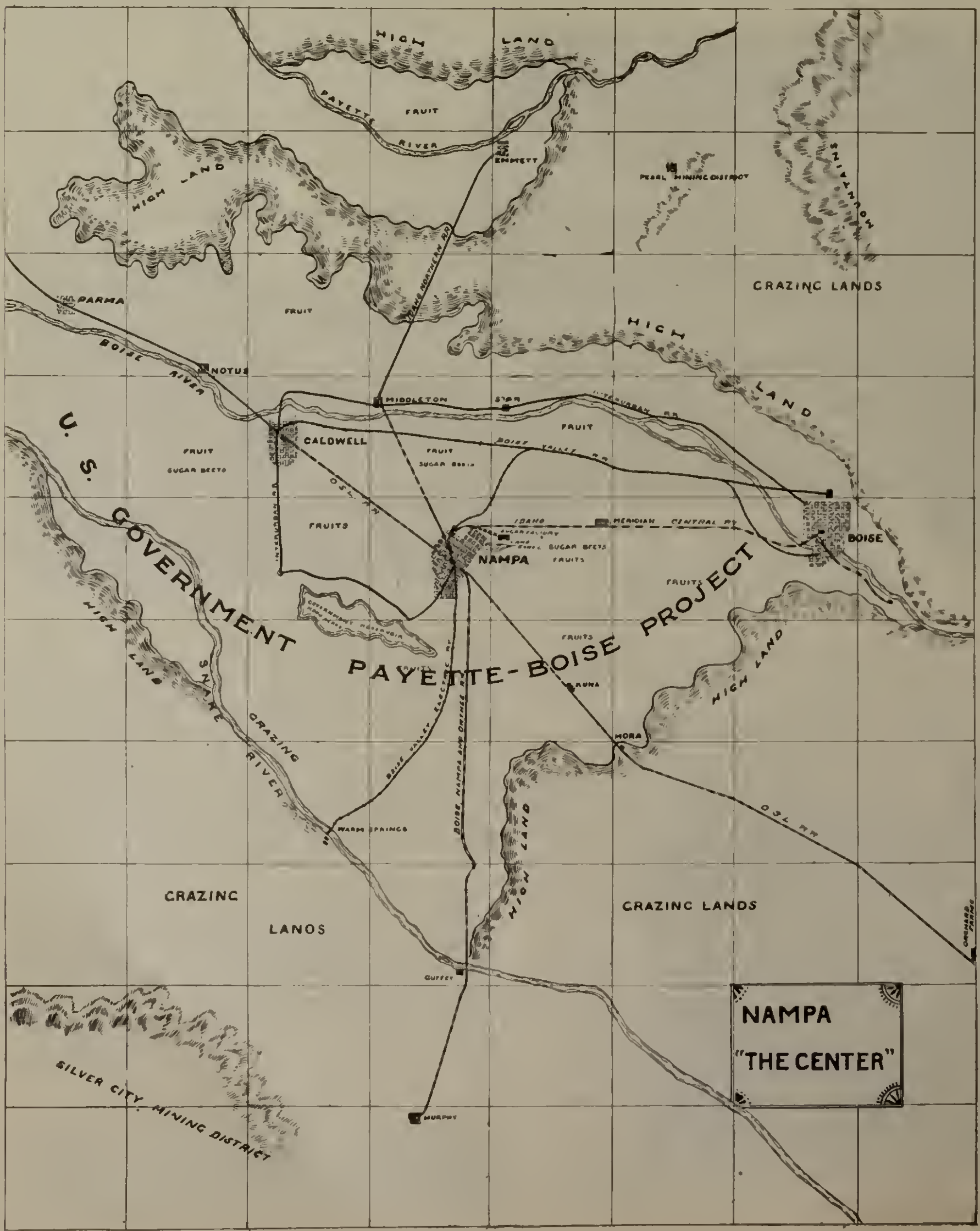
The development of power from the ninety foot dam back of Boise will also be of great advantage to the region. This power will be an asset of the project and under the control of the Water Users' Association. The power is available for municipal works, electric railroads and manufacturing industries.

Deer Flat Reservoir is First Work.

The preliminary investigations of this project were made during the summer of 1903, and as a result of the report of the engineers a preliminary organization of the land owners was effected and matters put in such shape that in 1904 the Secretary of the Interior gave his provisional approval, and complete investigation was completed under the direction of D. W. Ross of the Reclamation Service. In the meantime the land owners perfected their organization and contracts for land relinquishment were signed by individual owners.

The general plan was approved by the Secretary of the Interior on March 27, 1905. The first work specified was the completion of the Deer Flat reservoir, the building of a feeder canal to supply it and the digging of distributing laterals. For this work there was set aside by the Secretary $1,300,000 at first, but the amount was increased later to $1,500,000.

Contracts for the work were let early in 1906 and construction began the following spring. It is being pushed rapidly with the expectation that water will be delivered for next season's irrigation.



The project offers no serious engineering difficulties, but the results attained will place it among the large irrigation works of the world. Its greatest importance will lie, however, in the productiveness of the lands watered and their capability of supporting a dense population.

These lands lie at an elevation of from 2,100 to 2,800 feet. The summers are long and warm and the thermometer rarely reaches zero in the winter. It is an extremely healthful and bracing climate. Besides the usual grain and forage crops, all deciduous fruits and berries produce heavily.

The soil is volcanic. It is free from rocks, easily worked and rich in the necessary mineral constituents. The addition of vegetable mold with the working, under cultivation and the rotation of crops, add to its productiveness.

The farm unit to be fixed by the Secretary of the Interior under this project will probably be forty acres. The settler must comply with the provisions of the Homestead law and pay the actual cost of developing the water. It is expected that this will be about $25 an acre, payable in the usual ten installments. Practically all the government land under the project has been filed on; there are relinquishments that can be bought at reasonable figures.

The affairs of this project are under the control of a Water Users' Association composed of J. H. Lowell, of Caldwell, president; H. A. Partridge, Nampa, and A. A. Richards of Emmett secretaries; D. R. Hubbard, Boise, treasurer; E. M. Kirkpatrick, Parma; J. J. Walling, Nampa; A. J. Howd, Emmett; A. R. Stalker, Meridian; C. E. Paine, Roswell; A. J. Mitchell, Parma; Walter Griffith, Caldwell. The main office is at Caldwell.

Land Reclaimed Will Produce Heavily.

The land on this immense project is very prolific and with sufficient water will produce in quantities that are hardly conceivable. The use of water and the rotation of crops improves the soil constantly and the crops grow greater for a time each year, but never less. It may be that fertilizing material will never be needed upon these lands. It certainly will not in the time of anyone now living or their children. Being of a mineral nature the land needs vegetable mould to enrich it.

Farms in a good state of cultivation here produce from five to seven tons of alfalfa per acre in three cuttings, four to six tons of clover, forty bushels of wheat and seventy-five bushels of oats. The meadows furnish pasturage for a large number of stock after the last cutting. Clover seed crops running as high as twelve bushels to the acre and of alfalfa seed going fifteen bushels to the acre are obtained. All deciduous fruits and all berries produce abundantly and bring good prices in the Eastern markets, to which they are shipped in large quantities. Apples, pears and prunes grown in Idaho are especially noted and bring the highest returns.

Sugar beet factories that are in operation in this region show that wonderful results may be obtained from the growing of this saccharine vegetable. Farmers that have entered upon its culture in Idaho are making a great deal of money. They obtain large crops, the prices are high and the factories take all that they can get. The statement that we import $100,000,000 worth of sugar each year, when taken in conjunction with the fact that our factories are hardly keeping up with the increased consumption in this country gives the grower of the beet a comfortable assurance of the future.

Great Rush to the Reclaimed Regions.

The rush to the irrigated regions of Idaho is one of the sensational features of the Reclamation work. The wide vistas of rich sage brush land that have lain so long without the moisture to produce crops have been looked upon longingly by farmers that have come in view of them. Now that they are to be watered it is natural that there should be more or less excitement concerning their reclamation and that there should be an anxiety to acquire homes upon them. It is said of the lands on the Payette-Boise project that all that is necessary is to come into possession of them—that making money off them is a certainty. They are easily farmed, being level and easily susceptible of irrigation and the expense of removing the brush is not heavy, perhaps $2.50 an acre. The big sage furnishes settlers a wood supply and they can even sell it in the towns.

The United States government takes an especial interest in the Idaho projects, too, for it looks for results from them that will do much to justify the work of reclamation that is being carried out. There is little doubt that this branch of the Federal government will be able to point with full pride to its work in Idaho for all time. The results already are enough to show complete success. The rush for land demonstrates its value.

Work on the Payette-Boise system has been going on with great evenness and there has been little interruption. It will be carried to completion with a minimum of difficulty.

Boise River dam under construction looking downstream. Showing work and camp. Payette-Boise project. August 9, 1906.

Sub-Irrigation by Tile.

We believe that the time is not far distant when tile sub-irrigation will be one of the phases of the irrigation problem with which engineers will have to deal, says Irrigation Age. In the more thickly populated sections of the irrigated regions the adoption of tile sub-irrigation seems inevitable. These sections are becoming more generally settled each year, and private enterprise and the Reclamation Service are meeting the demand for additional water made necessary by this influx by the building of reservoirs for conserving the supply of flood water for application in time of need. Notwithstanding this preparation for the future there will doubtless come a season when the number of water users will deplete even the storage water supply. It is to forestall that time that tile sub-irrigation must sooner or later be gotten under way. The process is as yet only in the experimental stage, but even so far as it has gone it has shown that there is a great saving in the amount of water used. And before many years we believe that many of the projects to be constructed will be built something like city water mains, the water being run through pipe. For each year the value of water in this western country is being better appreciated and the enterprise which constructs a system where there is no loss by seepage or evaporation will be able to draw larger prices for its land.

Fruit as Food and Medicine.

The Creator in His wonderful economy always constructs with a purpose. He has distributed fruits all over the earth, and has caused them to mature at a season when the solid and carbonaceous foods are not needed by the body. The latter, when taken during the warm season, only clog and obstruct the vital machinery, resulting in disease; whereas, the juicy, stimulating properties of fruits keep the vital forces properly balanced and regulated.

Probably the most generally diffused fruit is the apple. According to chemical analysis, this fruit has 18 per cent solid matter and 80 per cent water, while milk has only 13 per cent solid matter, and oysters the same. Cabbage, the great stand-by of the laboring man, has only 8 per cent solid matter and 92 per cent water. Pears have about the same amount of solid matter as apples. Peaches have 20 per cent solid matter and 80 per cent water; while pork has only 24 per cent solid matter. We see, therefore, that fruits are richer food than milk or oysters, and approximate that of pork. Yet the laboring man thinks that he must have his bacon and that he cannot work without it.—Dr. J. P. H. Brown, before Georgia Horticultural Society.

University Stations.

Our Berkeley, California, advices of recent date are that President Benjamin Ide Wheeler and Professor E. J. Wickson, head of the Agricultural Department of the State University, have returned from a tour of the South, during which they inspected the various experimental stations being maintained in connection with the University.

The University party found the new buildings at Santa Monica in first-class shape and well adapted to the use for which they were planned. They are making a specialty of studying the eucalyptus trees and the authorities will soon publish a pamphlet telling of the results of their experiments.

A new laboratory equipped for the investigation of plant diseases was thoroughly inspected. It was just being occupied and will also be used for entomology and research work. Arrangements have been made whereby advanced students may pursue higher courses there. It is intended to serve the same purpose to agricultural students as Mount Hamilton does for advanced students in astronomy.

The other place inspected was Riverside, where a 20-acre tract was planted with orange trees for experimental purposes to demonstrate the value of different fertilizers.

The prominent people in the vicinity of each establishment are interested in the experiments and they are giving encouragement to the work.

The formal opening of the big laboratory at Whittier, another station which was visited, will take place in two months, and in January the Institute of Citrus Fruit Growers will be held about the time the station will be fully equipped.

The government has purchased the pumping plant and right of way for five miles of canal and laterals of the Colorado Valley Pumping and Irrigation Company, of Yuma, Arizona, for use in connection with the main Yuma irrigation project. Until the project is completed and the canal system is replaced by the government system, the pumping plant will be used to supply the present settlers with water. The price paid is $6000.

Veterinary physicians and surgeons advise washing the galled shoulders of the horse with a mixture of alum and water. This is soothing and cooling to the affected part.

A recent statement from the United States Weather Bureau at Washington, D. C., shows that an average of 800 people are killed annually by lightning in this country. This means one in each 100,000 of population.

An Iowa man got rid of the thistles in his pastures by cutting them off with a hoe just as they began to bloom, and then salted the stub and turned in his sheep.

O. H. ENSIGN.
Chief Electrical Engineer and also a Consulting Engineer, U. S. R. S.

Nampa, Canyon County, Idaho, a Live Business Center

WONDERFUL YOUNG CITY, HUB OF IRRIGATION AREA, JUMPS FROM 500 POPULATION TO NEARLY 5000 IN THREE YEARS, AND CONTINUES TO GROW AT SAME RAPID RATE.

IN this special issue of Orchard and Farm, giving detailed descriptions of the various irrigation projects of the United States, there may be several maps of the one entitled the Boise-Payette Irrigation Project, located in the southwestern part of Idaho, in the great Snake River Valley. If so, we wish to call your attention particularly to the one entitled "Nampa the Center," as we believe that it relatively defines the area of this project, as regards its commercial centers, and shows Nampa's commanding position in the center of the main body of the enterprise. This map embraces probably four-fifths of the area to be irrigated, the rest being in narrow areas extending along the rivers.

Just a Few of Nampa's Beautiful Homes

Location.

Nampa is located on a plateau about twenty-five miles wide, lying between the great Snake and the Boise Rivers, at an elevation of about 2500 feet, and is the most important city on the main line of the Oregon Short Line Railroad in this part of Idaho. It is sometimes called the "Junction City" on account of its being a railroad center, as will be noted from the following railroads: Oregon Short Line (Union Pacific main line), Boise, Nampa & Owyhee Railroad, Idaho Central Railroad and the Idaho Northern, and also its electric roads now under construction that will center here. This situation clearly reveals to the thinking man how completely this territory can be dominated by the business energy of the people of our city and make here the commercial center of southwestern Idaho. Nampa has been handicapped by the fact that it is the youngest city in this part of the state, and must overcome the trade relations and rates that have heretofore existed, but which are gradually being changed by her railroad situation, and she will be further assisted by the operation of the Interstate Commerce Law as recently defined in the Spokane case, which will permit of Nampa's obtaining proper freight rates and doing away with the discriminations that have been made against her.

Historical.

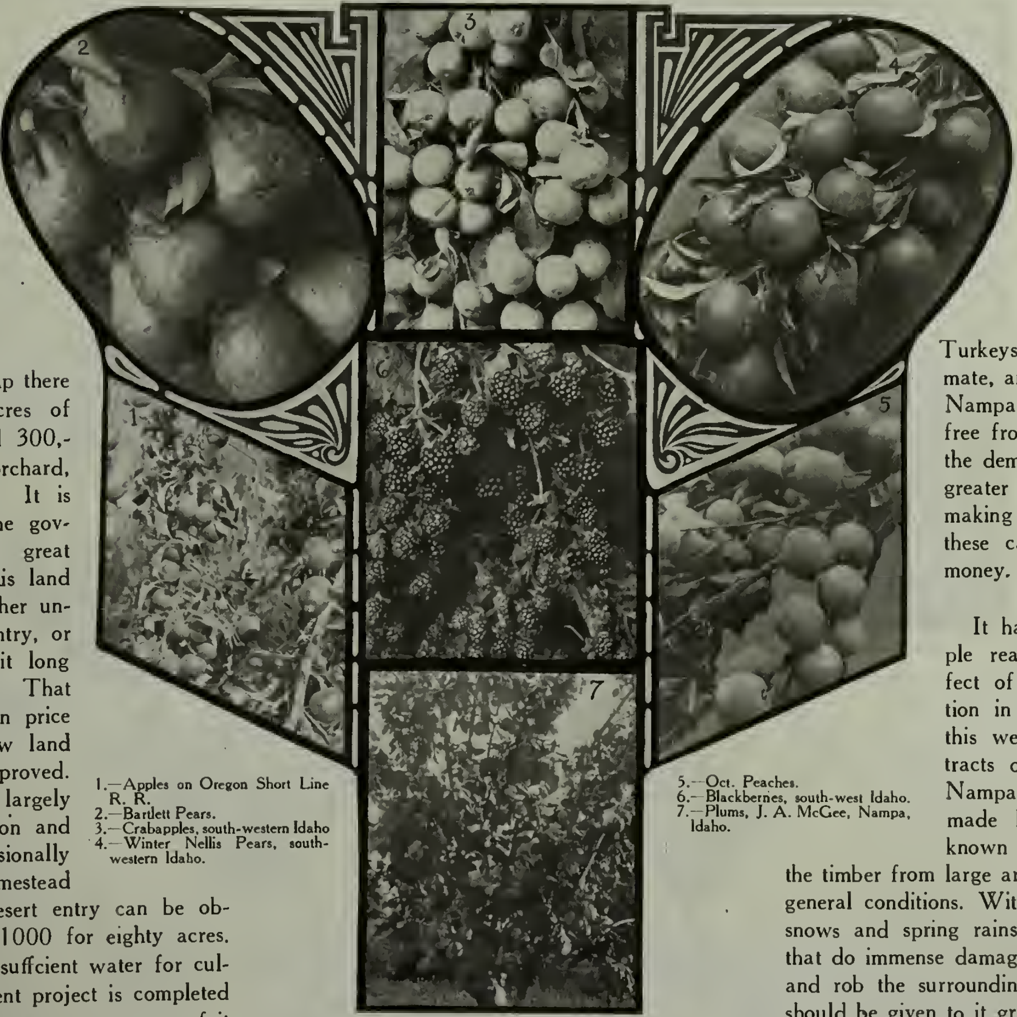
Nampa sprang into existence at the beginning of the hard times of 1890, and the early settlers rallied around a water tank of the Oregon Short Line Railroad. The struggle was a hard one for the next decade, as in 1900 the population numbered only 500. For the next three years railroad agitation kept the town from making much progress, but from that time to the present it has blossomed into a city, and a census taken in March, 1907, shows a population of 4826, which growth has been the marvel of sister cities, yet it can truthfully be said that Nampa is like a seed that has just burst, pushing its young sprout into the sunlight, attracting the attention of its neighbors, and soon to become a vigorous tree and spread its trade branches not only over southwestern Idaho, but the entire inter-mountain empire. Nampa's fame will not be based only upon the fact of its being the commercial metropolis, but upon the further fact that it is the center of a vast area of magnificent fruit, vegetable, grain, hay and grazing territory, with countless herds of sheep, cattle and horses feeding during the summer months upon the natural grasses covering the foothills and mountains on either side and coming down to this valley for food and protection during the winter months.

Climate.

It is a fact that cities grow, to a certain extent, regardless of the kind of climate, but how much more satisfactory it is to locate in a place where you can not complain of the climate. While no particular climate will satisfy all natures, there are places where the vast majority can be contented. That place where nature can have a rest for a few months in the year and thus be invigorated for the efforts of the coming season will produce the most abundant crops and the finest flavors, and so where the human system can have variety is the most beneficial for it and the most satisfactory. It is claimed that the place where life is the most agreeable and health is the best is Southwestern Idaho.

The climate of this section of that state which may be called the "Nampa Region" is designated as "mild," for there are no extremes in winter or summer. Owing, probably, to the high altitude, the heat of summer is not oppressive. That there is no heat of a nature to make human life uncomfortable is shown by the fact that there are no cases of sunstroke. The long, warm summers are necessary for the best maturing of the crops. The spring and the fall are very pleasant seasons. There is no rain from about June 1 to September or October. Occasional rains occur during the late fall, winter and early spring, but there is no "rainy spell." Snow falls from time to time, but it does not gather enough for sleighing, and if five inches of ice can be cut the inhabitants deem themselves lucky. The ground freezes from six to eight inches only.

Statistics compiled by the United States government show that this part of Idaho has the lowest death rate of any section of the United States. The climate is especially good for pulmonary and asthmatic troubles.



1.—Apples on Oregon Short Line R. R.
2.—Bartlett Pears.
3.—Crabapples, south-western Idaho
4.—Winter Nellis Pears, south-western Idaho.

5.—Oct. Peaches.
6.—Blackberries, south-west Idaho.
7.—Plums, J. A. McGee, Nampa, Idaho.

Farm Lands.

A glance at the map will show you that Nampa is the center of thousands of acres of farm lands. It will not show you, which is also true, that these lands are among the richest in the world. In the area covered by the map there are probably 75,000 acres of land under cultivation and 300,000 yet to be turned into orchard, alfalfa field and garden. It is to water this land that the government is installing this great system. Every acre of this land is claimed by someone, either under homestead or desert entry, or by those who have held it long enough to obtain patents. That which is for sale ranges in price from $30 to $60 for raw land and $75 to $125 for improved. The prices asked depend largely upon the state of cultivation and the improvements. Occasionally a relinquishment of a homestead or the assignment of a desert entry can be obtained at from $200 to $1000 for eighty acres.

All this land will have suffcient water for cultivation when the government project is completed next season. Crops may be grown on some of it with the new water supply in 1908. The soil is worked without difficulty, being light and easily plowed. It is of a mineral nature and lacks humus, so the more it is cropped and cultivated the better it becomes. To show its fertility, attention may be called to the stand of sagebrush with which it is covered. These shrubs grow so large that the farmers use them for fuel and actually sell wood from them in town. It only costs $2.50 an acre, as a rule, to clear the land of this brush, according to the estimate given inquirers. Eighty acres can be put in condition for farming in a very reasonable time. This is a large tract for general farming where the soil is so productive.

Irrigation.

This is what the Chamber of Commerce of Nampa has to say about irrigation:

"Do you know what irrigation means? It is practically an insurance certificate, for the seed that you plant is going to come to maturity and the crops be harvested if you do your part; that is, you see that the land is properly prepared, good seed put in, the crop cared for and irrigated when it needs water and harvested when mature. As we have no rainfall during the growing season, you can readily see that better results can be obtained by supplying moisture at the proper time than by depending upon a rainfall that may be too little or too much. The crop yield in an irrigated country is from two to four times as much as that obtained under other conditions. The method of irrigation depends upon the kind of crop. Grains and grasses are flooded; trees, corn, potatoes, sugar beets and other vegetables are wet by a stream of water running between the rows. By putting the water just at the time the crop needs it there is a continuous growth, no retardation by too much rain or a drouth, consequently the best results are obtained. We have no crop failures."

Crops.

The soil and climate of Nampa and vicinity being adapted for diversified farming, a man can raise the crop that there seems to be the most money in. This country will produce any crop that can be raised in the Middle West. As high as eight tons of alfalfa per acre, or five tons of timothy and clover; from forty-five to fifty-five bushels of wheat, from eighty to one hundred bushels of oats, four hundred bushels of potatoes, and five to six hundred bushels of onions. Yields of other products are in proportion. There is a ready market for all products. Fruits are also grown. Idaho is noted for and has won many first prizes at the big fairs for its fruits. Apples, pears, prunes, plums, quinces and practically all small fruits and melons are grown successfully in the Nampa region. Fair crops of apricots, peaches, nectarines and cherries can usually be depended upon.

The farmers and fruit growers are perfecting associations for their protection and will establish canneries and a manufacturing plant to make cider, vinegar, wines and marmalades from the products that are defective and not suitable to ship, thus enabling them to sell only first quality products and obtain the best prices for them, while also making money out of inferior qualities that usually go to waste. The farmer can readily appreciate the value of these associations and conditions.

Dairying and Poultry.

Nampa and vicinity is an ideal spot for the dairy industry, for the reason that it is a natural grass country and all food required by the cows can be produced very cheaply. There is one of the best home markets for creamery butter and cheese that can be found. The demand is greater than the supply, and these products are actually shipped into Nampa now. There are within a radius of ten miles of Nampa four cooperative creameries in successful operation that each year pay out to the farmers $200,000.

It would be hard to find a country better adapted to the raising of turkeys and chickens. Turkeys especially need a dry climate, and they thrive wonderfully. Nampa poultry is comparatively free from disease and insects, and the demand for these fowls is far greater than the supply. Anyone making a specialty of either of these can make a great deal of money.

Timber.

It hardly seems as if the people realized the far-reaching effect of President Roosevelt's action in creating forest reserves in this western country where large tracts of land, such as surround Nampa, must be irrigated to be made habitable. It is a well-known fact that the removing of the timber from large areas has caused a change in general conditions. Without the timber the winter snows and spring rains cause freshets and floods that do immense damage to property in their paths and rob the surrounding country of moisture that should be given to it gradually during the summer. such reserves have been made in the country which supplies southwestern Idaho with water, and, while the timber in them is of immense value from an agricultural standpoint, the reserve rules permit of its use in such a way that Nampa will receive direct benefit from its manufacture into lumber for many years to come. Being milled conservatively, this product will be used locally and not be sawed on a large scale in a few years and shipped out, as has been the case in other states. There is a very fine body of pine, tamarack and red fir timber tributary to Nampa that is accessible to the farmer and small manufacturer, and it is these people that the government is endeavoring to benefit.

Mining.

In the early '60s miners came from California to this territory looking for placer gold, and in one place, known as the Boise Basin, according to Wells-Fargo Express reports, over $200,000,000 in gold has been taken out. The territory is still being mined with dredge and hydraulic systems. Surrounding this valley are mountains containing many mines producing much gold and silver and some lead and copper. Millions of dollars in gold and silver have been taken from the mines in the vicinity of Silver City, Dewey and DeLamar, about fifty miles to the south, and it is to these mining camps and those of central Idaho, eastern Oregon, western Wyoming and Montana that the products of Nampa are distributed by means of the railroads and stage lines.

The mining possibilities of this portion of Idaho are just being ascertained, and in the near future these hills will be swarming with busy miners taking out the now-hidden wealth, creating a greater demand for the products of this valley.

Stock Raising.

Nampa, situated as it is in a valley surrounded by hills and mountains, is the winter home of sheep and cattle. In the summer, as already stated, thousands of sheep, cattle and horses graze in the highlands on the natural grass, and as fall approaches they are gradually worked down to the valley, where they are fed for a few weeks in the winter around a home ranch of probably eighty acres.

Sugar Beets.

In 1906 the Western Idaho Sugar Company erected a sugar factory at Nampa at a cost of $125,000. It has a capacity of 750 tons a day. The season of 1906 being the first, only about 40,000 tons were handled, but the farmer was so much pleased with the result that this year the acreage has been very largely increased, and it is anticipated that the yield will be at least 120,000 tons. The farmer receives $4.50 per ton, delivered at the factory or at any loading station on any of the numerous railroads running to Nampa. This crop has been exceedingly profitable, and in the near future another factory will have to be constructed. It is reported on good authority that the percentage of saccharine matter obtained from the beets at the Nampa factory is higher than any other factory in the state. It is also anticipated that the tonnage per acre will equal, if not exceed, that of any other point in the West. The hard labor in connection with the crop is contracted. Any farmer who has lived in the vicinity of one of these factories knows that land values increase from $200 to $250 per acre soon after the location of a factory, and as the Nampa lands are still obtainable at from $75 to $100 per acre, now is the time for any one wanting to make a change of location to go there and get the benefit of the rise in values that are sure to come, the Chamber of Commerce urges. The factory will keep 350 hands during the fall and winter months.

In connection with the factory, feeding yards are always established, as the beet pulp, when fed to stock, is very fattening. Thousands of sheep and cattle were fed in the vicinity of the factory all last winter. It can truthfully be said that there is hardly another industry applicable to a rural community that brings a benefit to the farmers and to the city near which it may be located as great as that resulting from a beet sugar plant. It must employ a large number of operatives, who, with their families, aid the city themselves in no small way, but its greatest work is in putting money into the hands of the producers. It opens to them a market for a staple product for which it will always pay good prices. It gives a certainty to the growers and the hundreds of thousands of dollars that it pays them goes to increase their bank accounts and enliven the business of the merchants with whom they must trade.

1.—Scene at depot, Nampa, Idaho. 2.—Dewey Palace Hotel, Nampa, Idaho. 3.—O. S. L. depot, Nampa, Idaho. 4.—Mennonite Mission. 5.—Crescent Brewing Company, Nampa, Idaho. 6.—Christian Church, Nampa, Idaho. 7.—Methodist Church and Parsonage, Nampa, Idaho. 8.—Irrigation Canal, Nampa, Idaho. 9.—Subway and Ice Plant, Nampa, Idaho. 10.—A drop in an irrigation canal, Nampa, Idaho. 11.—Irrigation Canal, Nampa, Idaho.

Neither must a sugar factory located in a country where irrigation insures a regular production of beets be compared to one in the rain belt, where it is possible not only for the farmers' crops to fail but for the factory itself to become unprofitable.

Industries.

During the year 1906 the Crescent Brewing Company established a brewery plant at a cost of $150,000, which is now supplying Western Idaho with beer that is preferred to all others. It is of a very superior quality, owing largely to the very pure water from which it is made.

Nampa has a factory for the manufacture of soft drinks, called the Crystal Bottling Works. It manufactures various kinds of ciders and sodas, ginger ale and mineral waters. This is an old institution and its goods are well known throughout this part of Idaho.

Nampa has a saw mill of which it is justly proud. The buildings are exceptionally well constructed and the machinery is of the latest pattern. In addition to its sawing capacity, which is 75,000 feet per day, it has lathe and moulding equipments and a box factory. It will employ from fifty to seventy-five hands. The lumber is obtained from the timber forests of Southern Idaho and is sent down the river to Emmett, where it is transferred to cars and taken to the mill. A large force of men was employed all last winter getting a supply of timber for the season's run.

Nampa also has two up-to-date planing mills that are kept busy with the contract work far ahead of their capacity, and it is only a matter of a few years when this city will be considered a lumber manufacturing center.

Also along the line of building material Nampa boasts of two artificial stone works, turning out concrete blocks of every kind and description, as well as cement bricks, of which many of the buildings have been constructed. These, in connection with the brick yards, saw mill and planing mills, amply supply the city with its building material.

As Nampa is located in a warm country ice is a necessity and there are two good artificial ice plants that supply an excellent product and make the city independent of winter freezes, which are very uncertain.

A neatsfoot oil factory is one of Nampa's new industries, having a $10,000 plant.

Among the industries that will have a large payroll and distribute considerable money in that vicinity is the Nampa-Payette Tie and Lumber Company, which is furnishing hundreds of thousands of ties to the Oregon Short Line Railroad and other roads, as well as timber for nearby mines.

Nampa is furnished with an unlimited supply of electric power that is obtained from the power plant at Swan Falls on the Snake River, thirty-one miles away. The local power plant that supplies the city with lights boasts of having the finest substation of any place west of Chicago.

Nampa has a steam laundry. This is modern in every respect, having a large and expensive mangle and a dryroom, the equipment costing $30,000. It employs fifteen people and does work for the surrounding towns within a radius of one hundred miles.

Hotels.

It is hardly probable that there exists an agricultural city of the size of Nampa that can boast of such good hotel and rooming house facilities. This condition has probably been brought about by the fact that the city is unable to build houses fast enough to take care of the people who go to make their homes there, and are of necessity compelled to occupy temporary quarters. Nampa is supplied with three hotels and some eight or ten good apartment and rooming houses. One of the former is practically known from coast to coast as being the finest, best equipped and best managed hostelry in the Northwest, the Dewey Palace Hotel. This property occupies a block of ground in the business center of the city. It is surrounded by ample lawns, shade trees and shrubbery; its magnificent and spacious porches on three stories, with an area of 25,000 square feet, are the rendezvous for the socially inclined during the summer months. The building itself is of four stories, containing ninety-two rooms, of which eighty-one are sleeping rooms. It also has seventeen bathrooms.

The hotel has its own water supply, the purity and softness of which is unsurpassed. This building, with its accessories, cost $250,000. From its tall towers a magnificent view of the surrounding country can be obtained.

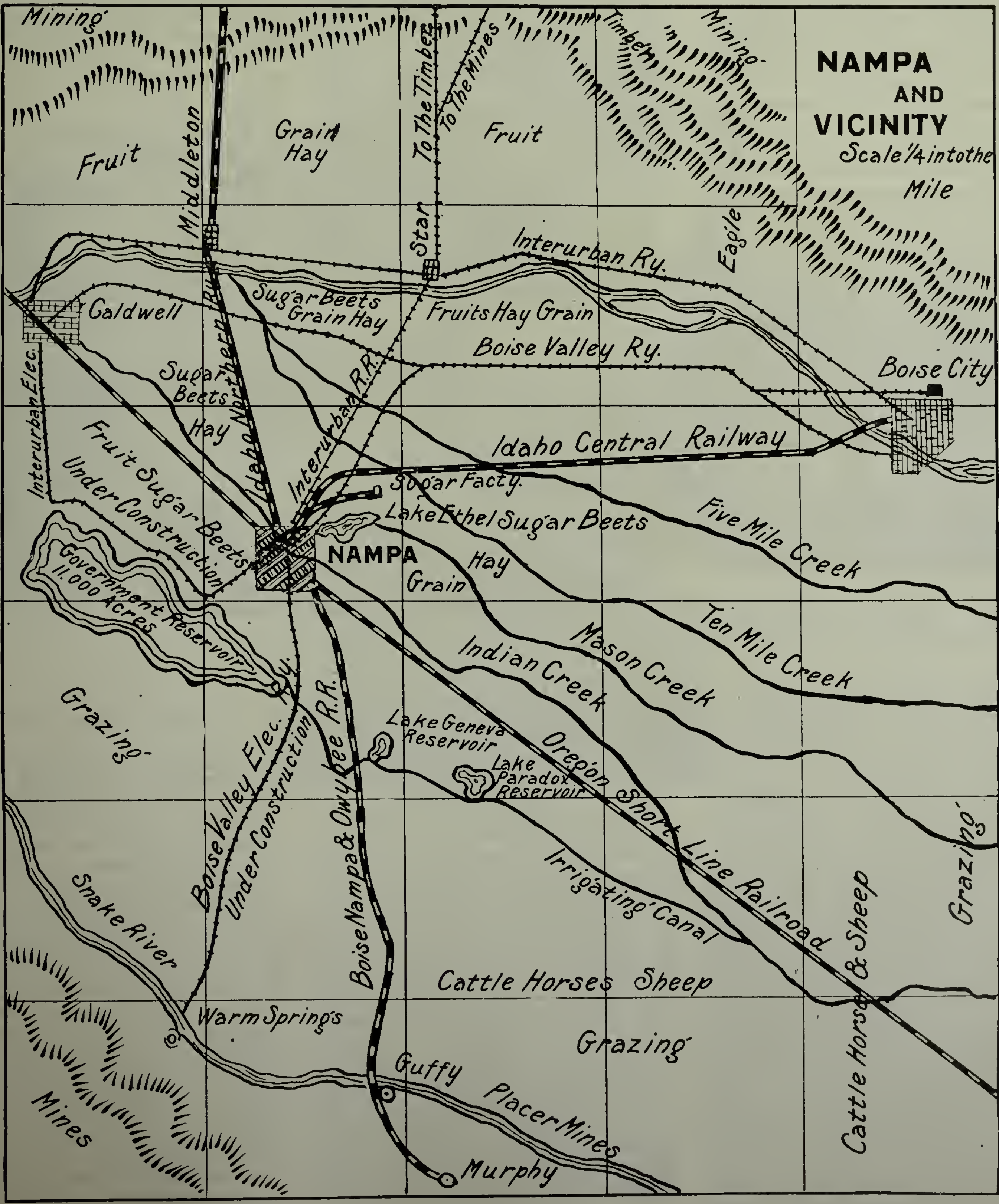
Schools.

The matter of education is a very important one in the development and growth of a city, and Nampa has endeavored to keep up educationally with its phenomenal growth. It has three large and commodious school buildings, one having been constructed this summer. The value of these properties, including equipments, exceeds $100,000. There are complete high school facilities, twenty-two teachers and 1252 pupils.

Along the educational line there is a city library which is a credit to the city. It will soon blossom into a Carnegie Library, as the millionaire steel king has given $10,000 for a building, which is now under construction and which will not only be an ornament but very complete in its appointments.

Churches.

Nampa is well supplied with houses of worship and is justly proud of them. It boasts of eight congregations having church buildings and two that are contemplating the erection of suitable quarters within the year. Those having buildings at this time



are the Episcopal, Presbyterian, Baptist, Methodist, German Baptist (Dunkard), Mennonite, Catholic and Christian. It would seem that this array would be sufficient to permit any man to worship God if so disposed.

Recapitulation.

There is no questioning the fact that Nampa is surrounded by a large body of magnificent agricultural, fruit and grazing land. These thousands of acres will support a city of ten times its present population, to say nothing of the various manufacturing enterprises and jobbing houses that help to make a city. So the Chamber of Commerce says it is very modest in making the claim that in the not far distant future there will be located at this point a population of 100,000.

There is no doubt of the business enterprise and push of a people that has done what the ambitious and ever-striving people of this live Idaho city have done; that have cleared the sagebrush from around a water tank and in a few years established a city with numerous churches and elegant schools, a water system belonging to the municipality and furnishing a supply of the purest water and at the same time a good net revenue to the city; adequate sewers, a capable volunteer fire department with its own gymnasium and club rooms that reduces the risk of loss by fire to a minimum, and consequently the rate of insurance; two telephone systems with lines extending all through the country, giving the farmer city privileges, and of which one, the Bell, has recently spent $100,000 in improvements and the other, the Independent, is placing all its cables in underground conduits; a street-car line that will connect the important sections of the city; three banks, a theater, numerous lumber yards, artificial stone works, many retail stores of all kinds, large wholesale houses, among which rises the large and commodious building of the Tuttle Mercantile Company; sugar factory, brewery, saw mill, box factory, planing mills, creameries, dyeing and cleaning houses, wide streets, miles of sidewalks, beautiful homes, public parks and two lakes. All of this forms a nucleus for a large city soon to be built—one in which people can live in health and happiness with all the comforts of life while laying up bank accounts.

One of the lakes referred to in the foregoing paragraph is the Government reservoir with twenty-eight miles of shore line and submerging 11,000 acres of land. This will always be a beautiful sight for Nampa.

The Nampa Chamber of Commerce has this to say of the spirit of the people and the press that did so much to work the magic that has created this city of the mesa:

People Had Faith.

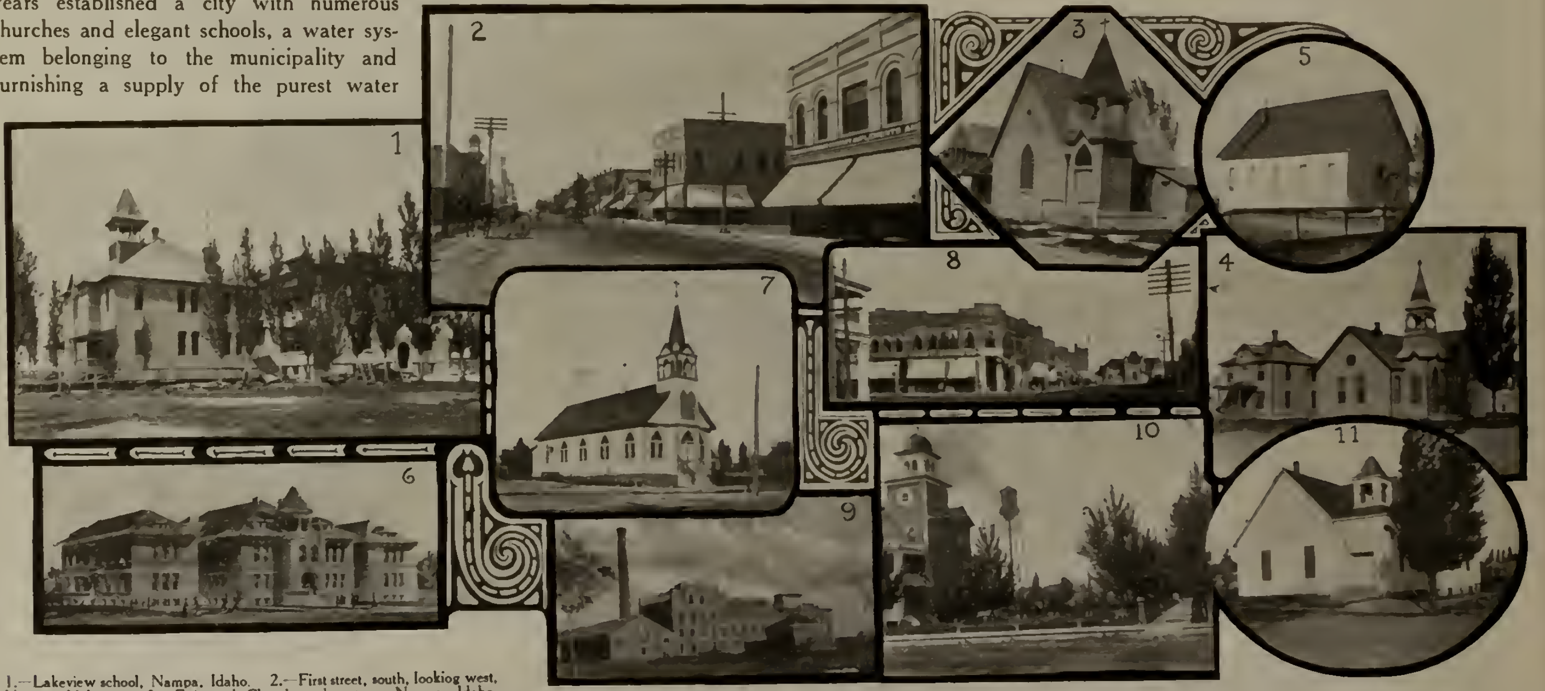
"When you consider that practically all of these institutions and conditions have been brought about in the past five or six years, you will realize that the people who have done this have had faith in their city and country, and among the valuable aids to this class of work is the newspaper, of which Nampa can boast of having two, one of them a daily, giving ample press reports each day, and whose heading bears the inscription, 'Always Boosting, Never Knocking.' It has been a power in the up-building of our city, for there are few cities of the population of Nampa that can boast of having a daily newspaper."

Barley and the Brewers.

The barley market is watched with interest by the brewers of the country. The growing of the best varieties for brewing purposes also concerns the beer producers. The recent high values in barley which are almost unprecedented in the history of the barley trade, have started a large quantity of Pacific coast barley eastward, according to the Western Brewer. Several round lots of Pacific coast barley were traded in at from $1.05 to $1.08, which was the last price paid. Another feature of this year's barley situation may develop in the fact that instead of our exporting barley to foreign countries we may import some. This will certainly happen if prices go much higher. There is also another possibility in case prices should go much higher, and that is Canada, although not having more than about 40,000,000 bushels, including the Manitoba crop, may find it profitable to send some barley to our Eastern markets, enough at any rate to fill some of the gap caused by the shortage of our home crop.

Dr. David Fairchild of the United States Department of Agriculture is co-operating with the Experiment Station of Wisconsin, in the breeding and dissemination of good brewing barleys and much improvement over the barley now grown for this purpose, is looked for.

Half the pleasure of a country life lies in the ownership of a good horse, says Farm Journal. Every farmer should have a horse that the wife and daughter can ride and drive, as well as the boys. In selecting such a horse, choose one about fifteen hands and one or two inches high, weighing about 950 to 1000 pounds. He should have a good even disposition, and go equally well in harness or under saddle. Small horses are better than large ones for light driving. Their feet are apt to be firmer and finer in texture and more likely to remain sound.



1.—Lakeview school, Nampa, Idaho. 2.—First street, south, looking west, Nampa, Idaho. 3.—Episcopal Church and rectory, Nampa, Idaho. 4.—Presbyterian Church, Nampa, Idaho. 5.—Mennonite. 6.—Proposed addition to the Renwood School, Nampa, Idaho. 7.—Catholic Church, Nampa, Idaho. 8. G Street, looking toward depot, Nampa, Idaho. 9—Western Idaho Sugar Co., Nampa, Idaho. 10.—Lawn of the Dewey Palace Hotel, Nampa, Idaho. 11.—German Baptist Church, Nampa, Idaho. (Dunkard.)

Publicity Brings Settlers.

Some apprehension is expressed by experts lest the irrigated lands of the West that are being thrown open will not be settled fast enough and suggestions of aids to settlers are made.

Settlers should be given every encouragement, aid and assistance possible and plans should be worked out to make their success certain, but the first great necessity is publicity—the attracting of the people's attention to these lands. This magnificent special edition of Orchard and Farm is the greatest effort in that work that has yet been made.

It will reach every corner of this country and go abroad as well. The man that wants to take up farm life, with its attendant freedom and independence, will find within the covers of this issue information that will direct him to growing and fertile sections in all parts of the West. Publicity such as this is what will do the first and most important work in settling the newly reclaimed regions. Orchard and Farm will keep up this good work.

Caldwell, the Magic City, a Marvel of the New Idaho

SEAT OF GOVERNMENT OF CANYON COUNTY AND SITUATED AMIDST THE FAIREST OF ALL RECLAIMED SECTIONS.—WITH GREAT STOCK AND MINING INDUSTRIES IT ADVANCES SWIFTLY.

CANYON County, the first agricultural county of the State, is located in the southwestern part of Idaho, close to the Oregon line. It is one of the smallest divisions of the State, but has within its boundaries natural resources that make it one of the most important and prosperous.

Geographically situated in the heart of what has been known for years as the Great American Desert, this county is nevertheless watered and made fertile by three of the State's largest rivers, the Boise, the Payette and the Snake. The last named of these, the "Great Water" of the Indians, bounds it on the south and west.

The climate of this portion of Idaho is delightful, having been compared by travelers with that of the most favored parts of Italy. The spring, which begins with the earlier weeks of February and continues far into June, is a peculiarly pleasant season. Refreshing rains fall at intervals during the earlier part of this period. The air is balmy and exhilarating, even at midday, and for weeks, between the gentle rain precipitations, a cloud in the sky is an extraordinary and noticeable sight. This is deemed by many to be the most enjoyable time of the year there. The summer is less pleasant, because of the increased heat and the almost absolute absence of rain.

During the summer the timbered mountains invite with their cool trout streams and abundance of game. In their recesses the sportsman finds quantities of grouse, deer, bear and cougar.

From Caldwell, the seat of government of Canyon County, it is but one day's journey to the Boise Mountains, a southern spur of the great Southworth range. They offer a wild, free beautiful recreation ground for those who seek the soothing influences and majestic charms of nature in her grandest aspect. Many are those that take a few weeks' vacation each year in the wooded glens and beside the cascading streams of these mountains.

Wonderful Crops Grow There.

If you do not wish to go by wagon or with pack animals on your trip to the Boise Mountains and enjoy the rougher side, the railroad offers a quicker and simpler way. You can leave Caldwell in the morning by rail and before dark be camped at Payette Lakes, the most beautiful bodies of water in the Rocky Mountains. Surrounded by sky-piercing, snow-capped peaks and black with unfathomable depths, these lakes rival in splendor the celebrated Lucerne in Switzerland. The great neighboring forests yield to the search of the hunter and his firearms the biggest game left on the American Continent. Big game hunters of this continent and Europe are finding their way to this region, with Caldwell as the starting point.

Summer in the Caldwell country is followed by an ideal autumn, bringing on its creaking wains bountiful crops. There is fruit of all kinds in great abundance, including the wonderful Idaho apple with its international reputation. It is shipped to all parts of the earth. The lesser fruits are grown in great profusion. Idaho fruits in general have never failed to carry away first prizes wherever exhibited, besides winning numerous medals at the Chicago, Buffalo, St. Louis and Portland expositions. Canyon County alone carried away the grand sweepstakes prize for grains and grasses at the National Irrigation Congress held in Boise during August, 1906.

1.—Building on Main Street, Caldwell, Idaho, 1907.

2.—Idaho Pioneers, Caldwell, 1907

3.—Street scene, Caldwell, Idaho, 1907. Depot in center of picture.

4.—Oregon Short Line Depot, Caldwell, Built 1907.

5.—Canyon County Court House, Caldwell, 1907.

Thousands of horses, cattle and sheep thrive on the ranges above the farming land where the grasses keep them in fine condition. The warmth of the valley affords them protection in the winter when the storms claim the heights for their revelry.

The winter is short, three months being its average limit. It begins late in November with heavy rains, succeeded by snow, which is seldom deep enough for sleighing. The thermometer rarely registers below zero. The wind never blows a gale in the valley. Taking this climate as a whole, the people of Caldwell claim it is superior to that of any other portion of the United States for tonic effects, salubrity, general health of man and beast and the maturing of the various important products that bring the most wealth to the farmer. There is no place where you will become more robust and revel deeper in the lust of living than you will in the Caldwell region, they say. The tang of the Eastern early winter is there without any of the hardships of that season further toward the Atlantic, and there are all the balmy breezes of Italy and California in their proper time, when the grape and the melon vie with each other in prolific growth.

Sugar Beet Lands Not Surpassed.

While Canyon County is justly famed for its fruit, it must not be supposed that the agricultural population relies solely upon the orchard for its support. Hay until recently has been the great crop of the farmers. Alfalfa grows luxuriantly, producing three crops, yielding from four to ten tons to the acre. Timothy and clover produce three tons to the acre, besides excellent fall pasture. Sugar beets are promising now, however, to be the most profitable crop of the future. According to the reports of experts, no better sugar beet lands are found in the United States than those of Southern Idaho. Last year the average yield of the first crop, and the first crop is always the poorest, was eighteen tons to the acre.

Besides fruit raising and the growing of hay, grain and sugar beets, there are splendid opportunities for the poultry fancier or the apiarist about Caldwell. Because chicken feed is cheap and the diseases that afflict the gallinaceous denizens of the farm are not known, the raising of chickens in this region is a source of large profit for those that pursue it intelligently and with care. Bees steal their sweets from the fields of clover and alfalfa that give a feeding ground for miles in all directions. Many carloads of the most finely flavored honey are sent annually from Caldwell to nearby and distant markets. Too much of this fine honey can not be produced.

The live stock industry furnishes a source of revenue fully equal to that of agriculture. Immense numbers of sheep, the total reaching close to a million, are wintered every year in the valleys of Canyon County. The wool growers provide a steady market for all the hay grown during the summer. The wool is shipped by the trainload to the East. More than 1,500,000 pounds were billed out of Caldwell alone during the last year. Fully as much more was sent from the smaller towns of the county.

The great expanse of free range affords ample pasturage for the extension of the stock industry, though cattle raising is not carried on as extensively as it might be.

1 —Flume, Highline Canal, Caldwell, 1907.

3.—Headgate, Silver Canal, Caldwell, 1907.

4

2.—Sebree Irrigation Canal, Caldwell, Idaho.
4 —Caldwell and Boise Interurban Electric Railway. Bridge over Boise River, 1907.

The wild mustang blood in the horses is being rapidly driven out by a better strain from imported registered animals, and it will be replaced entirely in time through this improved breeding. The horse exhibits at the county fair would not suffer by comparison with those in older sections of the East. Hogs raised on farms and fattened on Idaho corn and grain bring important revenue to the feeders.

The manufacturing industries of Canyon County are yet in their infancy. This county has had three kinds of immigrants: (1) The early settlers, attracted by gold; (2) the cattlemen, whose vast herds grazed on a thousand hills; (3) the agriculturist, the best known of them all, the most substantial—the man that came to stay. He came because he wanted to make a home and help in upbuilding a community, the fertility of the soil and the beauty of the climate attracting him. The farmer has given stability to the country and has opened the way for another that is wanted there now—the manufacturer. Caldwell is the center of a land of fruit, but there is no cannery there. Thousands of tons of fruit would go to waste annually but for the ingenuity of the growers in finding a profitable use or a market for it. A large cannery would utilize all this to the greater profit of the producer and to the certain enrichment of the owner. A vinegar factory and cider mill would pay in connection with the cannery. Annually shipping vast quantities of wool, Caldwell has no woolen mills. A starch factory could be successfully operated, as could a large distillery for denatured alcohol.

Cheap Fuel for the Manufacturer.

Manufacturing has the added advantage at Caldwell of an abundance of fuel and power, which are easily available. General conditions for profitable manufacturing could not be better.

The rich quartz mines at Pearl, just outside the north county line, and the older and more extensive workings in Owyhee County supply business to Caldwell, but there is little developed mining territory tributary to Canyon County. There are, however, at various points near Caldwell extensive coal deposits, excellent oil prospects, partly developed opal claims, a fine bed of clay, suitable for making chinaware, and other prospects, which only await development to add materially to the wealth of the district.

Caldwell the Magic City.

Caldwell, or, as it is sometimes called, the Magic City, by reason of its rapid growth, is located near the western line of the central part of Idaho on the main line of the Oregon Short Line Railway.

The city contains 4000 inhabitants and is twenty-four years old, having been platted by ex-Senator Caldwell of Kansas and his associates in 1883.

The location is an ideal one, being one-half mile from the Boise River, which assures a medium for conveying the sewerage of the city to a safe receptacle, thus giving a permanent and cheap sewer system, which is one of the most necessary assets that a city can offer to prospective investors.

Caldwell is the third city of commercial importance in the State.

This fact is largely due to its location, it is now and always has been the natural trading point for a large section of country, much of the business coming 75 to 100 miles, the trade coming that distance being from stockmen from the Jordan Valley and Stein Mountain country, who purchase in large quantities.

During the past fifteen years many canals and ditches have been constructed in this valley for the irrigation of thousands of acres of land, and the National Government is now constructing a system of reservoirs for the reclamation of 60,000 acres that heretofore have been fit only for the abode of jack rabbits and coyotes, but with an abundance of water will be one of the most productive sections in the State.

Some idea can be obtained of the mammoth proportions of the government project when it is stated that one of the reservoirs located six miles from Caldwell contains 10,000 acres, is ten miles long and three miles wide at its greatest width; the shore line will be twenty-nine miles; the average depth of water in this vast lake will average thirty feet.

This vast reservoir will be filled during the spring floods from the Boise River. Government engineers estimate that this body of water will irrigate 60,000 acres of land. It is a well established fact that forty acres of this land, when under irrigation, will support a family of five persons much better than eighty acres will in countries where rainfall is depended upon. This body of land is all within a radius of ten miles of Caldwell, and has never had a plow disturb its surface. This land lies south and west of Caldwell and it is promised that the water will be ready during the year 1908. In addition to this large body of agricultural land the city is and has been for fifteen years the trading point for a large section of country lying east and south and on both sides of the Boise River.

This latter land is under some of the oldest established ditches in the valley, and is all under a high state of cultivation. It is dotted with school houses and covered with waving fields of hay and grain and orchards, the substantial farm houses denoting prosperity and happiness.

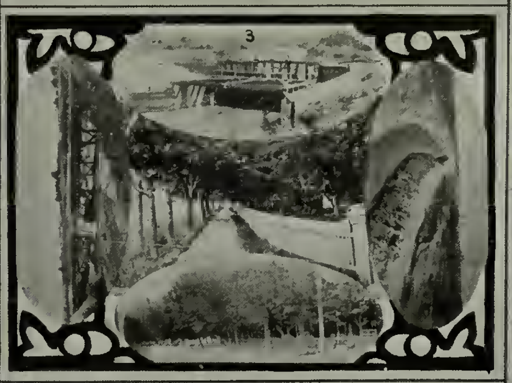
Great Area to be Reclaimed.

In addition to all this, when the present work is completed the scene of action will change to the north side of the Boise River, where lies an unbroken territory comprising 200,000 acres of land. This immense scope of country will be furnished water from the great Payette Lakes, lying 100 miles north of the city of Caldwell. This project, like the one now under construction, will be under government supervision, and the estimated cost will exceed $5,000,000. The greater part, some 95,000 acres of this undeveloped territory, will be tributary to Caldwell, which will be the base of supplies.

The above are the conditions surrounding Caldwell. We will now see what Caldwell has done for herself during the twenty-four years of her existence.

From one small frame school house there are now three large brick buildings, with a corps of 22 teachers. Seven Christian denominations own their own buildings; a city hall is almost completed at a cost of $22,000. The city owns its own waterworks, getting the supply from eighteen artesian wells, and is not only paying expenses, but there is a sinking fund created that will take up the bonds as they become due. No city in the State has a better sewerage system and one that is less expensive. The flushing is done automatically from the waters of Indian Creek, which pass through the city. A park of twenty-one acres is now owned by the city. It contains a lake of ten acres, which in a few years will rival those of larger cities in beauty. In fact, Caldwell was the first city in the State to thus provide for the future.

2.—Flock of sheep near Caldwell, 1907



Scenes in Caldwell, 1907.

Threshing wheat near Caldwell. 1907

Among the various institutions of the city none holds a closer place in the hearts of the citizens than the College of Idaho. This institution of learning is near the head of the procession. A certificate from the College of Idaho opens the doors of some of the leading colleges in the East to the applicant. Arrangements are now being made by the college board to erect new buildings on a twenty-acre tract the college owns adjoining the city. They will cost $100,000. The present buildings are not sufficient to accommodate the increase in the number of students desiring to attend the leading college of Idaho.

Wheat field near Caldwell, 1907.

Caldwell is not yet a railroad center, the Oregon Short Line being the only railroad at present, but there is now one under construction from this point—a road that will, when completed, extend from Butte, Montana, on the north, to San Francisco on the south. Col. E. R. Place, promoter and manager, made Caldwell the starting point from two considerations: One was that this point being on the main line, supplies could be obtained much easier than at other points; then again, this section of the country produces all the forage for teams and a large amount of produce for the camps. The other consideration was that if Caldwell would raise a bonus of $45,000, headquarters would be established there. You ask, "Did they do it?" The reply is, "They did, and in less than one week." The question is frequently asked, "Who is furnishing the means with which to build the road?" The Caldwellite usually replies: "We never make it a rule to look a gift horse in the mouth; it may be Jim Hill or Gould; we don't care a continental if it is Rockefeller, just so we get the road. We do know that eighteen miles of grading has been contracted for and that the contract for a steel bridge 758 feet in length across Snake River has been let." There is one electric line connecting this city with the capital thirty miles away; another electric road will reach the city next year. Street franchises have already been granted. Both these lines will be extended from Caldwell to adjacent towns through the most thickly settled portions of the county and will thus make Caldwell the electric center of Central Idaho.

Sheep feeding near Caldwell, Idaho, 1907.

Three Banks In Fine Condition.

There is no better index to the business of a city than the financial condition of its banks. Caldwell has three of these institutions, whose combined resources reach near the $2,000,000 mark, with deposits greater than all the other banks in the county combined. These financial institutions are all conducted on safe and conservative lines and are prepared at all times to accommodate their hundreds of customers with from $1000 to $50,000 for legitimate enterprises.

With the completion of the San Francisco, Idaho and Montana Railroad, it will not require a prophet to predict what the Caldwell of five years hence will be, for with the soil unexcelled, a climate unsurpassed, peopled by men and women of the highest type, it is safe to say that from a town of 4000 it will become a city of 15,000.

Caldwell stores are among the finest in Idaho, both in appearance and the quantity and quality of stock carried. It has three well equipped newspaper and job plants, publishing three weekly newspapers and two monthlies. In fact every line of business is well represented in the thriving city and every line is extending as new merchants and others establish themselves to enjoy the benefits of the increased volume of trade. It is an attractive prospect that presents itself to the man with a little money to invest. Caldwell's farmers never need to be "carried over" because of a failure of crops. There is little credit asked by these independent agriculturists. Credit abroad is naturally of the best under these conditions. There are fine business openings in this thriving city.

All the city's business blocks are surrounded by cement walks. There are also many miles of cement sidewalks in the residence portions. Paving of the principal business street in a substantial manner has just been completed.

Caldwell is particularly proud of its public buildings, which are substantial and beautiful. A new courthouse for Canyon county has just been completed there. It cost $75,000.

The Oregon Short Line has shown its interest in the town and belief in its future by erecting a handsome station, suitable for a city three times its size and one of the largest and finest along the line.

Substantial Fortunes Made In Caldwell.

Many substantial fortunes have already been made in Caldwell realty and many more will be made. Men who came to the town a few years ago, with but little money when its advance was beginning, invested their little wisely and turned over their holdings as values increased, own to-day some of the business buildings and rented residences that give independent incomes. There is even better opportunity to-day, for Caldwell's rise in the future will be even more rapid than it has in the past and values will grow proportionately as the importance of the city grows.

Realty was very active during the year, the brokers doing a business close to half a million dollars. The next twelve months will furnish a still greater volume.

1.—Graders at work on Government Irrigation Project, 6 miles from Caldwell, 1907. 2.—Site of Lavering Block, Caldwell, Idaho, 1907. 3.—Street Scene, Caldwell, Idaho, 1907, looking from depot. 4.—Phyllis Irrigation Canal, Caldwell, Idaho, 1907. 5.—Lavering Block, Caldwell, Idaho, built 1907. 6.—Riverside Irrigation Canal. Caldwell and Boise Interurban Railway. Caldwell in background.

There is one of the liveliest of live Commercial Clubs in Caldwell. Its members are imbued with the new activity that is advancing the region and infuse their enthusiasm into others who go to the place. They have full confidence in the future of the section and the city about which it radiates and are using every legitimate means to put the facts before the outside world. The club invites inquiry, personal and by letter. The hundreds of strangers who are visiting the Caldwell country are well taken care of in that town and are shown everything and told everything they want to see or know. The motto of the organization is "conservatism and true facts."

Caldwell has a free public library of 1500 volumes which has commodious quarters in the City Hall.

It should be mentioned that there is nothing of what is known as a "boom" in progress in Caldwell—no inflation that is beyond the resources of the region. The city is only keeping up with the great development about it. It is going ahead on safe, solid, conservative lines and every bit of growth, every dollar added to the front foot of realty are caused by new settlers opening up new land, by new trade developed by the railroad or some other legitimate condition. The people of Caldwell give the assurance that their city will always go ahead on these sure lines and that investors will find it one of the safest places for their money. Caldwell is as sound and healthy all through as an Idaho apple.

Plenty of Chance to Get Land.

Though it may be said that most of the land in the region about Caldwell is owned by someone outright, or is claimed under homestead entries, there is always a chance to get hold of some of it and at low figures, until it is improved. The price runs from the few dollars that raw sage brush land is worth now to $100 or $1000 an acre for improved land. The latter figures will show the farmer of other regions what profit there is in land under irrigation, properly cultivated, in the value increase alone, and not counting the revenue from the annual crop.

The Caldwell Commercial Club has this to say: "There is not another town in the West of its size that affords the opportunities that Caldwell does. Situated in the center of a vast area of fertile land about to be reclaimed, possessing cheap power for divers interests, drawing upon the stock and mining industries for hundreds of miles around, this city has become the throbbing heart of an immensely rich and active commonwealth. This region is a land of opportunity to many thousands in the crowded East, offering a competency to everyone, and to the ambitious and strong—fortune."

When the reclamation by the government of wide tracts of arid and semi-arid lands in the West became an assured fact, there was a great trend of inquiry and travel toward the regions that it was thought would spring into prominence under the vast systems of irrigation. Caldwell and its surrounding region, where there were miles of rich land waiting for water to make it productive, became at once one of the great centers of the new activity. Caldwell was already a lively town, being the supply center for a wide cattle and sheep growing and mining area, where agriculture was carried on also with such water as private enterprise and the limited rainfall furnished.

Life and Bustle on Every Hand.

"With water on all those lands, Caldwell will be a hummer," was what every wise person said to himself when he visited the place, attracted by the stir it was creating throughout the Eastern states and cities. Hundreds began slipping out to Caldwell. They were farmers looking for homes, business men with money to start enterprises in a growing city, speculators who knew that realty must rise with the general upward move. The tide swelled under the stimulus of the new development. Lands were taken up on every hand and extensive improvements begun. Everybody found something that suited him. The work on the irrigation system was begun and the stir became greater. The story of how money was being made traveled rapidly. Almost before Caldwell knew it, she had become a city.

To-day, with the water about to be turned on the thousands of acres that will be irrigated, Caldwell and its tributary region are throbbing with a greater life than ever. Thousands of farmers will soon be harvesting valuable crops off the rich reclaimed lands. Capital is pouring in and developing many resources that promise profit. The mining and livestock industries are receiving the stimulus of new investment, for the money that is coming in is overlooking no field.

Everybody in Caldwell is Satisfied.

The reputation given a city or farming community by those that have settled in either is what others that wish to make their homes in it must depend upon in deciding whether they should cast their lots in those places. The commendations given Caldwell and its surrounding country by the settlers already established there are sufficient to attract others. With this region it has been a record during all the years since the first settlement of contentment and prosperity—of comfortable homes established and money laid away in the banks. Business men that have opened stores or other institutions in the city of Caldwell have been unusually prosperous and there can be no business prosperity without a prosperity of the farmer and others that must depend on the area outside of the confines of the town for their livelihood.

The development of Idaho, great as it has been, is only beginning. The State has rich lands that are being irrigated, great sheep and cattle industry, its mines and other resources that hold a wealth only touched in a small way to date.

Lands at Mountain Home Yield Heavily Under Water

COMPANY IS PERFECTING MARVELOUS STORAGE SYSTEM WITH CHAIN OF RESERVOIRS THAT WILL RECLAIM RICH PLAIN SLOPING TO THE SNAKE, SWELLING RURAL POPULATION AND THAT OF TOWN.

1.—Public School, Mountain Home, Idaho
2.—Garrett-Bailey building, offices of Great Western Beet Sugar Company.
3.—The Garrett Block.
4.—Residence of W. C. Howie.
5.—The First National Bank.
6.—The Evans Hotel.

MOUNTAIN HOME! What an exhilarating ring there is to the name. It carries with it the tang of the broad freedom of the West—the idea of buoyant health and a land where comfort and enjoyment are to be had. The name has become famous in the picturesque inter-mountain region. People far away are beginning to know it well, too. It has a large part in the story of the new Idaho.

Mountain Home is in southern Idaho, and around it is an extensive irrigated section that is drawing a large proportion of the settlers hurrying to the newly-watered lands of the West. It is claimed for it that in all the so-called arid region there is not a place that offers greater opportunity to home-builders. The tale that embraces the redeeming of this fascinating spot from the sagebrush is one of enterprise on the part of private capital that arouses admiration at once. Individuals have accomplished that which the national service would have been proud of. Not only have reservoirs been established in the mountains, but canals have been excavated among them, bringing in their winding courses the stored water, which flows down them with great velocity to the plain below.

Idaho today is one of the greatest irrigation states in the West. It was at Mountain Home that the first system of storage reservoirs in that state was undertaken.

Garrett Forms Big Company.

The Great Western Beet Sugar Company, under the management of John K. Garrett, whose genius and capability have given the enterprise success, has taken up an unusual work at this place. It is bringing under cultivation one of the finest areas of land on the American continent, developing water in abundance where only a moderate supply had been hoped for by the earlier residents. Homes are spreading rapidly over the land as a result of the company's efforts and the sagebrush is disappearing before the grubbing implements of the settler, who can remove this slightly resisting growth with ease. Mountain Home, the central city and supply depot of the region, is growing too. It will be one of the leading business places in Idaho in a few years.

Capital has dared here and has won. Mr. Garrett and his associates have something to be proud of in what they have accomplished. They have not sought government aid and have not even made use of the Carey Act. They have simply spent large sums of money to develop water, and they supply it at a low rate to any person that takes up the desert land under the laws provided therefor. It is about the best proposition that has ever been offered home-makers at any place where arid lands have been reclaimed. Either an annual or a perpetual water right may be purchased from the Great Western Beet Sugar Company for these lands, for which the government makes but the usual small charge provided for desert locations.

One of the most remarkable areas of smoothly-surfaced land in the world is that surrounding Mountain Home. It was observed with deep interest by people that passed through it before the water was taken to it and commented upon. Men that knew land have said, as they gazed from car windows on the giant sagebrush, indicating rich soil: "If water were only on that land it would make thousands of people rich." Water in plenty is there now, and the dreams of those that were whirled through the Mountain Home country in the years past are being realized. It gives a satisfaction to all that have seen this land to learn that it is watered and that farmers are enabled to till it.

As smooth as a floor, the land radiates from the site of Mountain Home, located close to the foothills, for fifteen miles to the east, fifteen miles to the south and from eighteen to twenty miles to the west. It is not an exactly level plain, for it slopes gently to the Snake River, the slant being of just sufficient degree to give a perfect irrigating fall.

The soil is a dark loam, rich in phosphate, and averaging from two to eight feet in depth. It is very durable, and contains a large percentage of lime and magnesia. The farmers of the Snake

1.—Scene at Elmore County Fair, Mountain Home, Idaho.
2.—Overflow of Camas Reservoir, Mountain Home, Idaho.
3.—Scene at Elmore County Fair, Mountain Home, Idaho.

River Valley say that the longer it is cultivated the more productive it becomes. This is true. Cultivation of crops, working and watering has this effect on the new Idaho land.

Elmore County Full of Resources.

Mountain Home is the seat of government of Elmore County, which is full of resources and a favorite destination for the men that are seeking new homes in the western country. The diversity of industry that is offered gives everyone a chance. Mountain Home, as the principal town and distributing center not only for the watered lands around it but for this whole county and regions much beyond it, including the mines, is favored with advantages not possessed by many young cities.

The Great Western Beet Sugar Company, besides encouraging diversified farming and allied industries, has an ambition to make the Mountain Home country one of the greatest beet and sugar-producing regions in the West. It is projecting a large sugar factory, and is ready to erect it as soon as the acreage is sufficient.

The project of storing water to irrigate the lands at Mountain Home had been in the minds of men for a long time before it was finally carried out. In May of 1905 the Union Pacific Railroad Company, wishing to learn exactly what success Mr. Garrett's company was meeting with and to determine the probability of an adequate supply of water being obtained, ordered W. H. Graves, of Graves & King, civil engineers, to proceed to Mountain Home and make investigation of the conditions prevailing in that section of the country, and to report the possibilities of providing water for the irrigation and reclamation of a larger body of land in that vicinity. The following is a summary of his report, made after a view of the features most easily and quickly seen:

The present contemplated system of storage reservoirs and canals at Mountain Home consists, first, of a storage reservoir two miles north of Mountain Home, which stores and holds 10,400 acre feet of water. The second completed reservoir is in the Long Tom basin, twenty miles north of Mountain Home. This reservoir dam was constructed in 1904-5. It is sixty feet high and stores 15,000 acre feet of water. The next reservoir is on Camas Prairie, thirty-two miles north of Mountain Home. This reservoir stores and controls about 30,000 acre feet of water. It is built at the extreme lower end of Camas Prairie, where the snow-fall averages from four to twelve feet annually, and where there is a never failing supply of spring flood-water, sufficient in quantity to fill the present reservoir twice and possibly three times in any average year. To connect this reservoir with the Long Tom basin, it required the construction of fifteen miles of canal around a rough and precipitous country, one mile of which is through the mountain separating Camas Prairie from the Snake River Valley. Two large crews of men and teams were employed on this work all summer, and about 4 miles of the canal remain to be constructed. This work will be completed, and the waters from Camas Prairie will be delivered to the lands in the vicinity of Mountain Home by the first of July of the coming year. Large forces of men are employed on the tunnel construction, and the same is under contract to be completed by the first day of June.

Mt. Bennett from city reservoir, Mountain Home, Idaho.

Within easy reach and with dams of ordinary height there is a net total, making all deductions for loss, of 141,750 acre feet of storage, enough to give a liberal supply to 94,000 acres. By increasing the height of dams, this supply could be augmented so as to irrigate a much larger area. The total cost approximates $750,000.

Water for Many Thousand Acres.

The Oregon Short Line, becoming deeply interested in the successful reclamation at Mountain Home, sent Mr. Wiley there later with instructions to go over the region thoroughly. The result of this careful investigation, which included consideration of enlarged storage facilities, was the report that "the total area of irrigable lands embraced within the project is 278,000 acres, of which 195,000 acres are estimated to be first-class in every particular. Most of it is situated so as to be easily accessible from such a system of distributing canals as could be constructed without difficulty or unusual expense."

The report says that the permanent water supply from the floods in the drainage area is much greater than would ever be needed and continues:

The productive and commercial value of this land when brought under irrigation is so well attested that it needs no affirmation or argument in a report of this sort, but it would be necessary to consider its value. The value of the land of course determines the maximum price that can be reasonably expected for a water right, or what quantity of water will be necessary to reclaim and irrigate the land. Under the provisions of the Carey Act the government sells the land at the maximum price of 50 cents per acre, when the applicant can show that he has provided a suitable supply of water for reclaiming the land. And when the applicant presents the deed or certificate to a water right in an irrigating system that has been approved by the proper state authorities he gets his land at 50 cents per acre. The price of water right is usually fixed by agreement between the state authorities and the owner of the irrigating system. The current price for such water right at this time as determined by convention between the owners of several Carey Act projects recently constructed and state authorities, is $30 per acre, on the basis of a duty of 50 acres per second feet.

In view of the growing scarcity of agricultural land and the increasing demand of such land and the advancing price of irrigated lands it is reasonable to expect that if it could be shown that an irrigation system was unusually difficult and expensive to construct, a price of $50 or even $60 per acre would be arranged for and there can be no doubt as to a ready market for every acre of this land or at least the best of it at this price, for it would be cheap at $50 or even $100 per acre.

There are natural reservoir sites, favorably situated, both in relative elevation and in location, to meet the requirements. They present especial advantages as impounding basins in the character and extent of the tributary drainage area, in the favorable physical and topographical characteristics, and in being located in a district where the precipitation is sufficiently constant throughout the year to reduce evaporation to a minimum. The dam sites are peculiarly well adapted in all obvious respects for such purposes.

The Great Western Beet Sugar Company sells perpeteual water rights to land under completed ditches, at from $20 to $30 per acre. Good terms of payments are made by the company for perpetual water rights.

Reservoirs Impound Flood Waters.

Another reservoir on High Prairie, ten miles northeast of Camas Prairie will have a storage capacity of more than 200,000 acre feet, or sufficient to give 65,000 acres an ample supply, after making all deductions for seepage and evaporation. A dam only forty feet high will hold this much water. Lime Creek, one of the principal tributaries of the Boise river, is the source of supply.

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1.--Residence A. A. Brothen, Mountain Home, Idaho. The kind of homes newcomers are making.
2.--Residence John H. Garrett, Secretary and Treasurer Great Western Beet Sugar Company, Mountain Home, Idaho.
3.--Residence F. P. Ake, Mountain Home, Idaho.
4.--Residence R. W. Smith, Mountain Home, Idaho.

It is necessary to impound the flood waters that run to waste from the mountains and to do this every feasible site for catching and holding this water is being sought out. As a result a chain of reservoirs has been formed that will give plenty of water to an area as great as some served by large and ever flowing rivers. The work accomplished in carrying on this project stands high amongst all of its class. Heavy dams, concreted canals, winding flumes and lined tunnels are features.

It was John H. Garrett, organizer of the Great Western Beet Sugar Company and now residing at Mountain Home, where he is general manager and treasurer of the company, that brought this immense scheme to success. His name deserves a place in the history of great enterprises for what he has done at Mountain Home. His grit and perseverance and power to overcome obstacles that might daunt many men are examples for others to follow if they would achieve success. He associated with him as general manager of construction, C. C. Mortrude, a man of high ability; as assistant engineer Carl Maughmer, and as chief constructing engineer, G. W. Sublette, former engineer of the City of Minneapolis.

Although possessing many advantages, being the outfitting point for a rich mining section and the shipping center for a large stock raising district, Mountain Home had no agricultural wealth from which to draw. Its residents were ambitious to increase its population and importance and realized that they must look to the land for that. This land they knew to be highly productive, but water was needed. The land area was so extensive that they knew if it could be watered it would support a large population.

History of the Great Enterprise.

The only way to get water was to store the great floods in the mountains back of the town. In the spring the streams are torrents, fed by snow water. In 1888 the business men raised sufficient money to construct a small reservoir about three miles above Mountain Home. The floods were stronger than the dam and it was swept out.

A year or so afterwards a company was organized and on December 12, 1891, articles of incorporation of the Elmore County Irrigation Company were filed, the capital stock being $100,000 and the incorporators Samuel Doll, J. E. Harper and H. J. Caldwell. During the succeeding two years this company expended in the neighborhood of $135,000. The Mountain Home reservoir was built on the original reservoir site, covering about 700 acres and storing about 8000 acre feet; that is, sufficient water to cover 8000 acres to a depth of one foot. This reservoir, with enlargements, has done service ever since and is part of the present enlarged system.

The company referred to became involved beyond its credit, however, and failed in 1893. For several years the irrigation system was maintained only by earnest effort on the part of the few men directly interested.

In 1901 another company was organized—the Idaho Beet Sugar Company. It paid off the indebtedness and secured title to the property. Subsequently, new financial blood having been injected into the organization, this company was merged into the Great Western Beet Sugar Company, which succeeded to all rights and property interests.

The Great Western Beet Sugar Company will continue to go after water. It will increase the size of dams and put others on new sites as long as it is possible to augment the supply. The end will mean one of the fairest reclaimed sections in the world with a happy and prosperous population.

Fortunes for the Farmers There.

What are the prospects of the farmer at Mountain Home? The reader has already learned of the fertility of the land, the ease with which it can be irrigated and of the water supply. The clearing of the sagebrush entails small expense. The climate of Southern Idaho is well known to be one of the finest in the world, both winter and summer, making this region a delightful place of residence.

Sugar beets hold, and will always do so, an important place in the agricultural development of this section. The land is especially adapted to their culture. About twenty tons to the acre is the yield on Mountain Home lands. The price is $4.50 a ton at the railroad station. The percentage of saccharine matter in the beets is very high. The regulated water supply and great amount of sunshine make heavy crops certain.

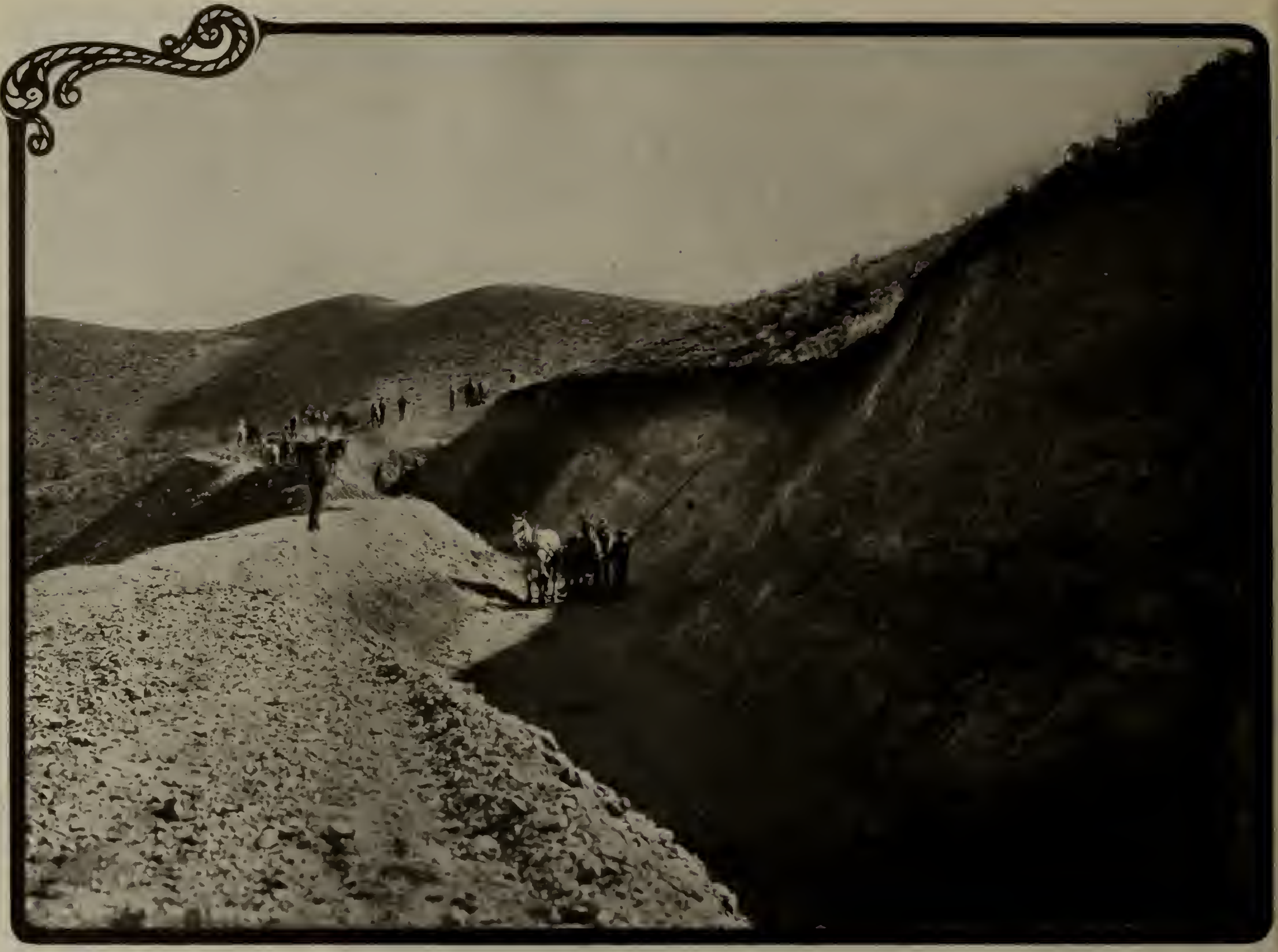
Alfalfa may be harvested three or four times a year and the yield is splendid. The report of the Senate Investigating Committee of 1893 contains a sworn statement from a Mountain Home farmer that he harvested that year 15.7 tons per acre. The hay sells in the town for $10 a ton in the stack and $12.50 baled.

Clover alone grows so rank that it is likely to fall, but when mixed with timothy is supported by the strong stems of the latter. There is an unfailing market for the mixed hay because of the immense cattle and sheep industry which itself consumes three-quarters of the supply.

Oats is a sure crop, going from 60 to 100 bushels to the acre. The grain is heavy, often weighing forty pounds to the bushel. Barley yields about sixty bushels and the price is high, there being a heavy demand for it. Corn is not grown to any extent yet, but experiments have shown that it does splendidly at this place.

Potatoes yield from 300 to 700 bushels per acre. The Idaho potato has an established market in Eastern cities, its rare excellence being well known. Onions grow to great size and compare well with the Bermuda product, being of mild flavor.

Every kind of garden vegetable and the melons thrive in a wonderful way with half the labor of cultivation and other attention required elsewhere.



Canal building near Mountain Home. Great Western Beet Sugar Company. This Canal is 16 miles long—is built through a rough mountainous country. On this canal route is a tunnel 6280 feet long. The canal carries 250 cubic feet of water per second and is kept running full nine months of the year.

The soil is comparatively free from weeds and from the bugs, worms and other pests that the Eastern farmer must contend with.

Fruits of the Finest Quality.

Peaches ten inches in circumference are grown at Mountain Home and the trees are weighted down with them. The largest of them have just as fine flavor as any and all are delicious to the taste.

If the apple didn't grow at its finest at Mountain Home it wouldn't be part of Southern Idaho. The flavor of these apples has been given precedence by experts over the Eastern ones. They are of beautiful color and very sound. All that can be grown find ready sale in the East.

The prune is the leader among the fruit crops. The trees come to maturity quicker than others and the yield is extremely heavy. The Idaho prune is snapped up by Montana, Colorado and other nearby states. Such of the product as Chicago and other Eastern cities can procure brings 10 per cent more than other varieties.

Grapes develop well, the bunches being heavy and thick on the vine. Berries grow to great size and are delicious. Cherries are a popular and profitable crop. All the other deciduous fruits produce excellently.

The Mountain Home section is a natural hop region. Hops yield from 1000 to 1500 pounds an acre the first year and after that from 1800 to 2400 pounds. They are of perfect quality, not being surpassed by any in the United States.

In fact there is yet to be discovered any marketable product, fruit or cereal, grown in the temperate zone that this region will not produce with amazing success.

The raising of blood horses and cattle will be an important industry there. Mr. Garrett is one of the leaders in this. He has imported some thoroughbred animals, and in the entire state there is no finer stock than he has.

Mountain Home Will be Big Place.

The future prospects of the city of Mountain Home are the best that a town could have. Its growth is certain. It is beautifully located at the edge of the hills and looks down over the new alfalfa fields and orchards to the Snake, which skirts the lower part of the land tributary to it. Elmore County, besides the rapidly developing agricultural resource, has many more. It is a great sheep and cattle section and rich in minerals. Atlanta alone has produced $12,000,000 in gold and one mine at Rocky Bar $3,000,000. New processes of treating ore have caused the opening up recently of many rich mines that had been shut down. New discoveries are being made. Though millions of dollars have been taken out of the mining region tributary to Mountain Home, only the smaller part has been touched. Thousands of acres of the finest timber in the country, 95 per cent of it unlocated, lie in this county.

Mountain Home is on the Oregon Short Line Railroad, the main line of the Union Pacific, between Chicago and Portland, Ore. It is 1772 miles west of Chicago and one night's run from Portland or Salt Lake City.

The population of Mountain Home is increasing rapidly and is near 2000. The town has among its other fine buildings a $30,000 brick hotel and a $20,000 brick schoolhouse. There are more than 400 pupils enrolled at the school.

Electric power will aid in manufacturing enterprises. An electric railroad to Bruneau Valley, twenty-five miles away, promises increased business. The town is electrically lighted and has a fine water supply. All sorts of business enterprises are prospering there. Three weekly newspapers are published. There are two thriving banks.

Mountain Home is not on the site where it was first located. Some years ago the town was moved to its present site. The postal authorities have never taken cognizance of the change. In the eyes of that department, Mountain Home is just where it was first started.

The Great Western Beet Sugar Company is offering every inducement to settlers on the lands and to those that come looking to establish industries or enter into business in the town. Inquiries made of this company or of the Mountain Home Commercial Club will elicit the fullest information concerning this remarkable region.

Pocatello Takes Name of the "Key City" of Idaho

WITH IRRIGATED REGIONS EXTENDING FOR MANY MILES AROUND, FREIGHT RATE ADVANTAGES AND ABUNDANCE OF CHEAP POWER, IT WILL BECOME A LARGE AND BUSY PLACE.

SITTING up among the Idaho mountains, in the center of a region that is capable of supporting 50,000 people, amidst scenery that is unsurpassed, cut by a crystal river, and in a dry, exhilarating climate that stirs men's energies and ambitions, is the lively, growing city, Pocatello, one of the most important factors in the trade and commercial enterprise of the great inter-mountain region.

1.—West Public School, Pocatello.

2.—Electric power house on Port Neuf River, Pocatello, Idaho

3.—Masonic Temple Block, Pocatello, Idaho

There is a splendid future for this mountain city. Its advance during the next few years promises to be remarkable.

Pocatello lies to the extreme east of the state and is becoming known as the "Key City of Idaho," which name, its citizens say, it is justly entitled to. It is supported by many industries, being first of all a great sugar manufacturing center. Wool and live stock, poultry and bees add wealth. Wide areas of irrigated land yield everything that field and orchard and garden know, save tropical products. Mines are being developed. Electrical and direct water power that would operate the factories of a Lowell or a Leeds are actually going to waste.

This prosperous young city, when it wishes to give a demonstration of its possibilities and show the reason for its present size and activity, points to the map of Idaho. This city, its residents read you from the map, is the commercial center of 30,000 square miles. Whole Eastern states that support half a dozen cities are smaller. Of this area 1,500,000 acres are under cultivation by irrigation—not from uncertain rainfall—and the acreage susceptible of being watered and producing abundant crops has hardly been touched. The future will bring canals to nearly all of it, and Pocatello will receive population and trade from every new section that is watered.

The men who have helped Pocatello grow, who are using every effort to increase its prosperity today and make it the splendid city that they believe it will be, went there originally to find out what truth there was in the glowing stories of its advantages. Short observation was sufficient to convince them that the truth had been told, and they stayed. They ask no one now to believe, without investigation such as they gave, anything they say about the splendid inducements Pocatello offers, but they ask that investigation of every man that has money to invest or to establish himself in a new place. They invite them all to visit Pocatello. There is so much growth there, so many channels for making money, so many clearly profitable enterprises only awaiting persons to take them in hand and develop them, that the citizens are not afraid that anyone will be disappointed.

Special Freight Rates Enjoyed.

Railroad corporations are coldly practical. They never lay tracks under the impulse of sentiment. They want to see business first. Pocatello is rated by them as one of the most promising commercial cities in all the inter-mountain country.

The map shows that the Oregon Short Line and the Oregon Railway and Navigation Company's line, with their various branches, stretch out from Pocatello to tap every section for miles around and add to the volume of trade. Electric feeders, operated cheaply by the abundance of power and giving, in consequence, low freight and passenger rates, are to radiate to irrigated sections.

Pocatello has been recently made a railroad terminal point, which places it upon the same footing as Salt Lake City regarding freight rates. This will make it a great wholesale and jobbing center. Merchants are keenly alive to this advantage. The railroads, realizing the city's strategic importance as a shipping center, have granted this common point rate, which includes not only the most advantageous tariff on all goods carried into the city, but a special distributing rate for all merchandise sent to points outside.

Through this distinct advantage Pocatello will become the distributing and supply point for the hundreds of retail dealers and jobbers doing business in all the great government-irrigated districts to its west in Idaho, it is confidently asserted.

Then there is the great factor in the making of

1.—General Hospital, Pocatello, Idaho.

2.—Center Street, looking west—west side, Pocatello, Idaho.

3.—Brewery, Pocatello, Idaho

4.—Church, Pocatello, Idaho

cities—water power—to be used directly or for the making of electricity. With cheap power manufacturing thrives and a city grows. Pocatello has already large quantities of cheap electricity and thousands of horse-power, easily developed, are going to waste within its environing region. As the wholesale trade and general business of Pocatello and the population of that city and its tributary territory increase the necessity for factories will grow. There are many inviting fields for manufacturing enterprises open there today. Local companies are being formed to embark in this line of enterprise, and outside capital will find attractive opportunities.

Two large wholesale houses have already seized upon the opportunity offered at Pocatello, and are doing an extensive business. The irrigation systems that are being opened on all sides are developing a tremendous country for settlement, and new towns are springing up in every direction. Pocatello is looked to for supplies and is recognized as a shopping headquarters. From this city's location at the base of the foothills there stretches far to the north and west a country as level as a table, rapidly becoming the site for leagues of small farms.

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2.—Main Building, Academy of Idaho.
4.—East Side Public School, Pocatello, Idaho.
5.—Academy of Idaho, Pocatello, Idaho.

6.—Bannock County Court House, Pocatello, Idaho.
7.—One of Oregon Short Line Railway Shops, Pocatello, Idaho.

The Indian reservation in which Pocatello formerly lay was opened by the government five years ago, the territory thus given over for settlement extending from five miles north to eighteen miles south of the city. Within the next three years the entire part of this tract north of the city will be irrigated by the government, making homes for at least 3000 more families.

Population Doubles in Few Years.

Pocatello's population is 8000. It has doubled since 1900. Building operations are outstripping the supply of workmen. It will become the largest city between Salt Lake and Portland, its people firmly believe.

Division and mechanical headquarters of the Oregon Short Line Railroad Company are located there. On the payroll are 1400 men, all residents of the city. The railroad company has $1,000,000 invested in its permanent plant and is improving it yearly. A more elaborate station, embracing a first-class hotel, and a viaduct connecting the two sides of the city are being considered.

Pocatello's public schools are equal to any in all the West. The Academy of Idaho is located there. It is a state institution of the first merit. There are eight religious denominations represented by fine church edifices. A $35,000 Y. M. C. A. Building is in course of erection. A magnificent Carnegie Library is also going up.

Pocatello is a city of homes, as well as business. It is a delightful place to live in, both from social and climatic reasons. Its people are the frank, cordial, open-hearted sort typical of the West, and the newcomer soon feels happy and contented.

The purest water is supplied at low rates from a municipal system, one of the finest in the world. Brought from high places in the mountains, it has a pressure that is a sure safeguard against fire.

This remarkable offer, that should attract the attention of manufacturers everywhere, is made by the American Falls Power and Light Company: To any new enterprise endorsed by the City Council of Pocatello it will give power for one year free of cost.

Woollen Mills are Needed.

There is a great opportunity for manufacturing woollens. There are 3,500,000 sheep in the Pocatello region. The cheap power should induce the establishment of extensive woollen mills.

Building material is cheap. A satisfactory common brick is made extensively. There is a large cement block plant in operation, and many handsome buildings have been constructed of its product.

Inexhaustible beds of rock from which a fine quality of cement can be made lie near the city. A large company has been organized to develop them, but there is plenty of chance for others to profit from these deposits. The demand can not be met. The government is far behind in its supply of cement. There is an estimated general shortage of 15,000,000 barrels. The price is advancing rapidly. Cement can be produced at Pocatello at $1.10 a barrel, and this, with the cheap freight rates, precludes competition.

If the wet process is used the waste lime from the many sugar factories may be utilized in making cement, materially decreasing the cost of production. If the ordinary process is followed, there is an abundance of calcium carbonate at hand. Analyses place the Pocatello cement material above all others.

There are large deposits of clay suitable for the making of crockery of the better grades and drain pipe near the city. Vitrified brick would also be a profitable output.

Rich mines are being developed in the Pocatello region. There is already much shipping ore, and a smelter would pay.

All about Pocatello the government and private corporations are busy bringing water to the sagebrush lands under many projects. Despite the 1,500,000 acres under water already, the work goes ahead unceasingly.

All these projects Pocatello claims as portions of the trade regions controlled by her. Enough, surely, to make an important city.

Sugar Industry is Extensive.

North of Pocatello there lies a far-stretching agricultural district, needing only close cultivation to make it one of the finest in the world. As this is brought into bearing still more will be added to the resources of the city.

The great adaptability of the soil in the Pocatello region to the sugar beet has caused a sugar factory to spring up in almost every town throughout it. Five thousand acres are sufficient to supply a factory. In 1906 this district produced 64,000,000 pounds of sugar. The acreage is increasing, and other factories are contemplated. Hundreds of men are employed, and Pocatello receives benefit from the industry. The profits of the farmers that grow the beets are large and certain.

The United States Agricultural Department gives the first place to the Upper Snake Valley for the production of grains, quantity and quality being both considered. Sixty bushels of wheat, ninety of oats and seventy-five of barley are common yields, and not the records by any means.

Pocatello has a brewery that employs many hands and distributes its product for 250 miles around. The finest quality of malting barley is produced in this district, and the excellent water and cheap power make this the natural home of breweries. That product will be shipped from there to every part of the United States in time, it is thought. The heavy potato yield offers opportunity for denatured alcohol plants, which would be very profitable, commercial alcohol having become a prominent commodity.

All the Fruits Are Grown There.

Every variety of deciduous fruits, berries and melons and all sorts of vegetables are grown in profusion in the Pocatello country. The city promises to become a leading cannery center.

There are many flouring mills in the tributary region, water and electric power being employed to operate them. With the hard wheat grown in the region, the flour is of the finest quality.

There is every opportunity for the man that tills the soil. New farmers are going to this section all the time, and they are all prospering. Alfalfa and beets give profits from the start.

It is impossible in the length of this article to tell all that is interesting about Pocatello and of all the chances there for the newcomer. The Commercial Club, composed of live men that have themselves found a profitable field for the energy they have employed, asks you to visit the city and be convinced; or it will send you a booklet that will give you some attractive facts and which also contains a table of figures that will show you how this mountain city is favored in the way of freight tariff. All questions concerning the city and the region in which it lies will be answered promptly by the secretary of the organization.

The officers of the Commercial Club are J. H. Brady, president; J. C. Weeter, vice-president; D. W. Church, treasurer; J. Rosenberg, secretary. The Board of Governors consists of the four gentlemen named and William N. McCarty.

Minidoka Project is Scene of Agricultural Development

THE Minidoka Project in Southern Idaho has probably attracted more attention than any of the others that the government has had under way to date, except as to magnitude of engineering feats. Minidoka was brought into the limelight, because it was one of the earliest of the projects to be opened, the lands were all public and of fine quality; it was nearer the centers of population than most of the other "early" projects and enjoyed the first rush that the opening of the government systems has produced.

Minidoka Dam, Idaho.

Results there have been watched with much concern by the Reclamation Service and with great interest by whatever part of the public was keeping up with irrigation matters. The opening of the tract was the occasion for many newspaper and magazine stories. Minidoka may in some respects be called the pioneer of the new reclamation world that the government engineers are discovering inside of the land Columbus found.

To date the results have been very gratifying to the government, and those settlers that didn't go in too early and try to hold possession of desert tracts upon which they had to live, whether they could produce anything from them or not, are satisfied that they have independence and a happy life in their reach. They are industriously cultivating and improving and the stretches of desert that but a short time ago supported no human life are being made to bear crops. Orchards, gardens and alfalfa are being planted. It is a transformation that forms a sublime salutatory for the Reclamation Service.

The Minidoka tract lies in the big bend of the Snake River Valley. It embraces about 130,000 acres of land lying on both sides of the river, in Lincoln and Cassia counties. The tract, because of its level character and good soil had for many years been looked upon by engineers as a most feasible one for an irrigation project. The plans were approved by the government in 1904. The work of building the dam was commenced in December of that year. The canal work was begun in July, 1905. Water was turned into the ditches during the spring of this year. Some farmers that didn't think the water could possibly be turned on this season were caught without their land prepared and lost the advantage of this year's crop. Others that were ready planted and did well.

Snake River Supplies the Water.

Water for this project is diverted from the Snake river and carried by gravity canals to about 80,000 acres, of which 72,000 are on the north side of the river and the remainder on the south side. From 50,000 to 70,000 acres of good land lie above the gravity canals and these will be watered by pumping. The diversion works

Water going over spillway, Minidoka Dam, Idaho.

that have been constructed contain facilities for generating electric power for this work.

There are about 25,000 acres of state land under the project. The rest is government. The state land is not located in the usual way, but is appraised and sold at auction. None of it can be sold for less than the appraisement and that can not be less than $10 an acre. For the state land the successful bidder pays one-tenth of the purchase price down, if that price is not more than $25 an acre; if more two-tenths. Sixteen years' time is given and 6 per cent interest is charged. This is a little different from the government charges for similar land, which are practically nothing. The government charges no interest.

The state lands are also divided into 80-acre units and they are still open for settlement. The water right has to be obtained for them the same as for government land.

The dam in the Snake at Minidoka is of the rock-fill type with earth and gravel back filling and concrete abutments, cut-off and core walls. A solid concrete dam with five 8x12 regulating gates is placed in the diversion channel through which the Snake's flow has been discharged since the channel was closed by the rock-fill. A heavy earth embankment lies on the upstream side. The spillway, on the left bank of the river, is ample to carry off the greatest possible flow of flood water without overtopping the dam.

The length of the entire structure is 14,412 feet. The dam proper is 85 feet high, 245 feet wide at the bottom and 25 at the top and 700 feet long. It forms a lake two miles across at its widest place and thirty miles long.

The rock-fill is constructed of chunks of lava, ranging in size from a few cubic inches to four cubic yards or more in volume. The smaller rocks and gravel and sand, sluiced in, fill the interstices. In filling the deep channel, stones of not less than two tons weight were used, until the velocity of the water was checked, after which smaller ones were put in. The embankment is faced with earth containing from 35 to 50 per cent clay. The core wall is founded on the solid rock bed of the river and effectually shuts off any water that might otherwise get out underneath the structure. The contractors carried on much of this work during high water, which rendered it much more difficult.

Lands on Higher Levels Are Watered.

The canal on the south side of the river has a capacity of 100 second feet. It is designed with a view to enlarging it some time to 800 second feet. It is twenty feet wide on the bottom. One second foot will be required for eighty acres of land.

The first 9000 feet of the main north side canal is cut in solid rock. This canal is thirty feet wide on the bottom. Its capacity is 1200 second feet, or one for every 60 acres irrigated.

The soils under the Minidoka project are remarkably free from alkali. They vary much in character and texture, but have been classified as follows: Medium to fine-textured sandy loam, often containing considerable gravel and underlain by a light subsoil; very light to loose sandy loam that is underlain by a subsoil of heavy material; a brown, rather heavy loam; a dark brown or black sticky clay loam or alluvium.

The ditch on the south side of the river conveys water to a reservoir from which it will be raised by pumps in three lifts to irrigate lands at higher levels. Power to run these pumps and for other purposes is generated at the big dam.

To guard against any possible shortage of water the government has established a reservoir at Jackson's lake also. The south fork of the Snake, which has its source in the Yellowstone Park, flows south for about 100 miles, passing through this lake. The reservoir to be formed by it will hold more than 500,000 acre feet of water.

Settlers Located the Lands Early.

During the greater portion of the year the government has much more than enough water for the Minidoka region, though 4000 second feet must be allowed to pass on down to satisfy prior rights below the dam. It was to guard against any possible shortage that the Jackson's lake reservoir was constructed.

The cost of the water rights under the Minidoka project is $26 an acre. The first payment will not become due until December 1, 1908. The government does not ask pay in advance.

It is said that one man can clear an acre of the land in one day. Split cedar posts cost 15 cents each and 350 are needed for a farm. Barbed wire fence costs about 4 cents a pound. Bricks are being made and there is plenty of material for concrete.

Minidoka is in about the same latitude as Milwaukee, but the climate there is modified by the Japan current in the Pacific ocean. The altitude is about 4000 feet. All kinds of grains, vegetables and most of the deciduous fruits do splendidly in the rich soil. The summers are long and warm and three crops of alfalfa are grown.

There are five towns located on the tract and all are growing. The educational and social conditions are of the best. The O. S. L. Railway passes through three of them, bisecting the tract.

Two years before the water came, all the government land had been located by settlers. They could derive little revenue from the soil without water. It taxed the means of many to live so long without making any money. For that reason there are numbers who cannot perfect their improvements and have to sell. Their relinquishments may be had for from $300 to $3000, according to the location of the land and the improvements. For this reason there are still openings at Minidoka for those with a little money.

The rush to the Minidoka tract is probably indicative of that which will take place wherever a project containing much government land is opened. Though there were but 940 farm units, 3,600 filings had been made as early as the first of this year. Many settlers had to leave because they could not afford to hold on.

Settlers are Busy Establishing Themselves.

A letter containing questions of inquiry sent by the editor of this publication to the Commercial Club of Rupert, one of the towns on the tract, with a request for condensed answers, brought out the following very succinct and unique letter of information from Mr. J. S. McQuiston, president of the Club:

Rupert, Idaho, June 14, 1907.

Land has all been entered Relinquishments are all the time being made and others filing. Improvements are selling for anywhere from $300 to $3000, depending on class and location. Party buying improvements takes the relinquishment and files on the land. Government still has some work yet in putting in headgates, taps and minor matters. Water is now flowing through all the canals and farmers are irrigating their crops. Some of the farmers were skeptical about having water this year and did not put in crops or only a small area. Crops that are in are looking fine. Small grain and vegetables constitute the crop, quite a good acreage of potatoes being in. Fruit and shade trees were generally set out this spring. This is a level stretch of country and roads are splendid.

The settlers come from all agricultural districts, some of them from old irrigated sections and some from the Mississippi Valley. All are enthusiastic as to the future, those relinquishing do so for the reason they do not have the funds to go ahead with their improvements. Everyone is taking hold enthusiastically; no disputes have arisen so far, except that one farmer and a ditch rider have had an altercation, an arrest arising.

There was a fear that some of the crops were suffering for water during a time the government was repairing a break in the main canal, and talk of filing claims for damages was indulged in, but fortunately rain came to Uncle Sam's relief and the matter will probably be dropped.

No fraud in the construction has come to light and we think none will likely appear. Houses range from 10x12 shacks that were early built and some of which have not been replaced, to substantial residences, running as high as $2500 in cost. The building that is now being done, as a rule consists of three and four room houses. Do not understand the Government has established any particular size of building to be erected on the farm units.

Splendid wells, furnishing the purest of water, can be had on any part of the project.

Three towns are located on the project, Scherrer, the first one off the main line of the railroad has two stores and a postoffice only; Rupert, the second from the main line, is in the center of the project, probably has a population of 500, has all kinds of business represented; Heyburn, the third town, likewise has a good population and all kinds of business. Rupert and Heyburn each has a bank; Rupert has two newspapers and Heyburn one.

The farm units being only 40 and 80 acres in size, the project is thickly populated.

Plans are being made to place launches upon the reservoir lake for use of pleasure parties. The Government is placing shade trees about the dam and it will some day be much of a pleasure resort. Schools, churches and lodges are all established.

Lubin's Plans Outlined.

David Lubin, whose work on behalf of agriculture we have long known and admired, has been explaining the purposes of his institute. In a recent address at Berkeley, Cal., he said:

At the present time the summary which is obtained from the different countries showing the crop reports, is not accurate, and thus the equity between supply and demand is not obtained. For this reason there is continually a wide fluctuation in the markets.

The International Agricultural Institute is to consists of two houses. The upper house, or general assembly, is to be composed of representatives from each nation, the number depending on the class of that nation. Countries of the first class, as the United States and England, will have five votes in this assembly, while Cuba, a type of the lowest class, will have one vote.

The other house is composed of one representative from each nation who has a number of votes according to the class of the country he represents.

Through the agricultural department of each nation a crop report will be forwarded to the various representatives and these men will summarize the world's products. This institution will not fix prices, but the equity between supply and demand will be determined.

The institution is to meet in Rome, where a large building is now being erected for its headquarters. All of the larger nations have already selected delegates and the first meeting will be for the purpose of fixing a method of procedure.

Last year's output of walnuts in California was 5355 tons. Some claim this will be lessened this year, while others say this year's output will be fully up to the last.

Hawaii exports to the United States $29,000,000 worth of products and receives from the United States more than $14,000,000 worth.

The Kona Vineyards Company, engaged in producing wines in Kona, Hawaii, has increased its capital from $50,000 to $1,000,000.

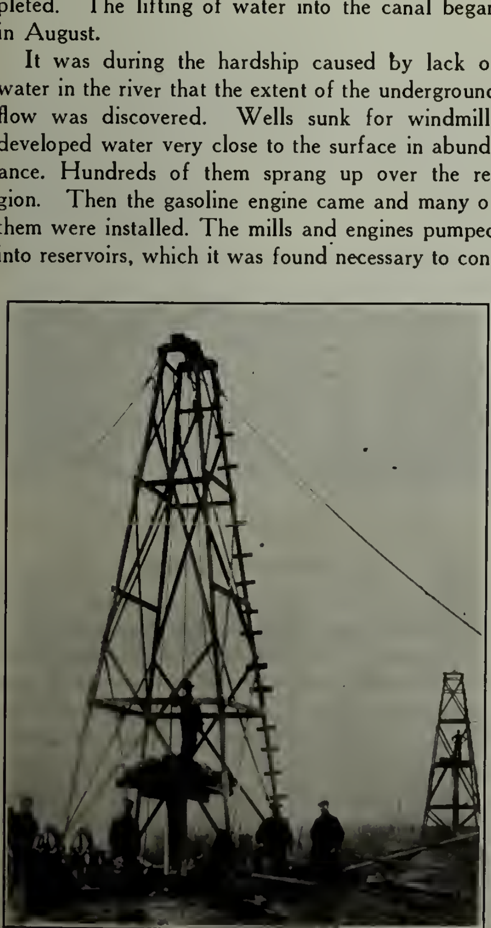
KANSAS PROJECT

Four Miles of Wells Yield Water for Land

GARDEN CITY PROJECT DEPENDS ON UNDERFLOW OF THE ARKANSAS AND TWENTY-THREE MAMMOTH PUMPS SUCK IT INTO THE CONCRETE CONDUITS

THE pumping projects that the government is carrying out for the watering of lands are prominent among their class because of their magnitude, and the ingenious methods used to lift the water that flows beneath the surface of the land into ditches. Of the pumping schemes, that at Garden City, Kansas, has the distinction of being on the historical spot where the irrigation of what is known as the Great Plains of the Semi-Arid Region, began. It was here that canals were built after a settler had demonstrated that heavy crops could be raised by that method. He ran a simple ditch from an abandoned mill race near Garden City. The canals that were subsequently built were almost emptied by the people of Colorado, who took the water from the Arkansas in their own state, having been converted to irrigation also, to the sorrow of Kansas. The Garden City is the first of the pumping projects to be completed. The lifting of water into the canal began in August.

It was during the hardship caused by lack of water in the river that the extent of the underground flow was discovered. Wells sunk for windmills developed water very close to the surface in abundance. Hundreds of them sprang up over the region. Then the gasoline engine came and many of them were installed. The mills and engines pumped into reservoirs, which it was found necessary to construct in order to utilize the water to the best advantage.



Putting down wells on Garden City Project.

Gravels Carry Stream of Water

The canal from the Arkansas, when the government was asked to look at the possibilities of reclamation in that locality, carried water enough, at its fullest, to irrigate about 8600 acres of land, and 15,000 acres could have been reached with more ditches, but it could not be depended on to carry even the amount necessary for the 8600 acres, and crops on the lands dependent upon it frequently suffered. The engineers took accurate measurements of the underground flow and decided that a full supply could be obtained from it at the reasonable expense of $30 an acre for the 8600 acres under the canal and perhaps for the full 15,000 acres of irrigable land.

It was found that in the water-bearing gravels of the Arkansas bottoms was a stream that carried 6,400,000 cubic feet each twenty-four hours through a cross section 24,000 feet in length and 100 feet deep. Allowing for a porosity of one-third in the water-bearing gravels, the engineers' report says, this was equivalent, under normal conditions, to a continuous flow of seventy-four second feet, or 54,000 acre feet in a year. It was decided to use a little more than one-half of the ground water.

To bring this water from its gravel course up to the ditch, it was agreed that a series of wells would have to be bored and pumps of great capacity installed upon them. The result was the leviathan pumping system that is nearing completion at Garden City. It will lift 30,000 acre feet of water during the irrigation season. The location of the pumping plant is well adapted to catch and conserve a large part of the annual fall of moisture. South of the Arkansas large areas of flat land lie between the steeper sand hills, which catch the rainfall and naturally drain it toward the region from which it will be drawn.

230 Wells and 23 Pumps.

There will be 230 wells in this system and twenty-three pumping stations, operated from a central power plant. Electricity, generated by steam power, will run the big pumps. Ten of the stations will be on the north side of the river and thirteen upon the south side. There will be a crossing by means of an inverted siphon.

The total length of the line occupied by the wells and conduits of the various stations is 23,000 feet. The individual stations are 1000 feet apart along the line of the main conduit. Each pumping station consists of ten bored wells. These are connected by suction pipes to a No. 9 vertical shaft centrifugal pump, driven by a twenty-five horse power vertical motor. The rectangular portions of the pits containing the pumps at seven of the stations are constructed of concrete to protect the machinery. One well near the central pump house of each station is 300 feet deep, and twelve inches in diameter. All the others are from 40 to 60 feet deep and fifteen inches in diameter. The casings are perforated to admit the flow of water. Each of the stations will discharge into a concrete-lined flume, or surface conduit, which will discharge into the Farmers' ditch, the name of the canal that is to serve the land. The location of this project is in Finney county, just west of its boundary with Kearney county, where the headgates of the canal were built.

Something About the Wells.

The average distance from the land surface to ground water throughout the well area is six and one-quarter feet. On a large part of the line of pumping plants, it is less than this and consequently the pumping pits will have a varying depth of from five to ten feet. The suction pipes are so designed that they may be removed readily for the purpose of cleaning or inspecting the wells. These wells are constructed in pairs and placed as close together as practicable. Each of the sixty-foot wells contains 160 square feet of percolating surface. The end pits can be supplied with three wells, instead of two, if deemed advisable. It is proposed to develop a high specific capacity in the wells by running clear water into one, while its twin, five feet away, is pumped vigorously. The 300-foot wells are perforated opposite all good water strata passed.

The yield of each of the 60-foot wells is from 400 to 600 gallons a minute. The deep wells, which are to contain 787 square feet of percolating surface, will yield under a ten-foot head 787

Ditch south of river at Garden City Project.

gallons a minute, and under a 15-foot head, 1800 gallons. It is estimated that the total yield of each set of ten wells under a ten-foot head will be 4387 gallons a minute, or 8.75 second feet, and under a 15-foot head, 6580 gallons per minute, or 14.6 second feet.

The underflow water of the Arkansas river at Deerfield was appropriated, for the purpose of carrying out this project, by Charles Slichter on behalf of the United States Government on June 7, 1905. Filing on an underground flow was rather a novel proceeding. The Finney County Water Users' Association, incorporated under the laws of Kansas, received applications from owners of 12,000 acres of land and contracts were approved for 9625 acres. As before stated about 15,000 acres can be covered by the ditch and if enough water should be developed the larger acreage will be served.

Work Raises Value of Lands.

All the lands under this project are in private ownership and had been so years before the work was begun. Before the project was undertaken, good uplands with water rights under the Farmers' ditch were quoted at from $20 to $30 an acre. They are now selling for from $50 to $100 an acre. The lands will ultimately be cut up into forty-acre tracts.

The development by the government of this fine underground water supply has given a great stimulus to private pumping and many acres not under the ditch system are being watered from shallow wells with gasoline engines and pumps. These lands have also appreciated in value.

The soil, under this project, is a black sandy loam and very fertile. The principal products are alfalfa and sugar beets. A beet sugar factory is being erected near the project. The principal market is Garden City, which is also the largest town in the neighborhood. The Atchison, Topeka and Santa Fe is the railroad that this tract depends upon for transportation.

The elevation at Garden City is 2925 feet. The temperature ranges from 20 to 105 degrees. The average rainfall is about twenty inches.

These lands are subject to being cut up into farm units and sold, as under all other projects.

The Need of Forest Protection.

The late William H. Mills, for many years at the head of the Land Department of the Central Pacific Railway Company, was one of the most far-sighted men of his age. He excelled in forestry, penology, and like advanced subjects. In several notable public addresses he predicted, many years ago, that the American people would suffer from the reckless destruction of their forests.

We speak of Mr. Mills' prediction now because many of his associates still live, and because he started a number of active men to studying forestry and the effects of their denudation.

We desire to call attention to the fact that, as Professor Edgar L. Larkin has said, starvation and freezing confront the future generations of men unless we become more provident in handling the wealth of nature. The Geological Survey officers at Washington have recently called attention to the fact that waste of the Nation's resources must stop to insure a comparatively proximate era of prosperity. They emphasize the fact that the destruction of forests near the sources of important streams, and the improper cultivation of sloping lands, cause the rich soil to be washed away from the fields, and deposited in streams and harbors. In addition to these evils we have the direct and irreparable loss of the forests themselves. This results in floods at the time of storms, droughts thereafter. Without great forests to hold the rains the water runs away in torrents, after which the fields and plains are baked to the dryness of a desert.

We are comparatively new in America in subjects connected with irrigation, but in Germany and other old countries scientists have learned how valuable it is to conserve the water supply by protecting the forests.

The connection of forestry with irrigation has been studied in Germany for years. One authority on the subject, Professor Ebermayer, has conducted extensive experiments, with the result of estimating that evaporation of soil water in forests amounts to 85 per cent less than outside of them. While the forests do not create water springs, they feed and sustain them, in addition to the preservation of soil moisture resulting from protection against drying winds and the rays of the sun. Wherever forests are absent drouth, storms, and sudden floods can create conditions less frequent in well-forested countries.

The preservation of forests not only assists farmers, miners, and all who in any way cultivate the soil or get power from waterfalls, but forests have a marked and salient effect on climate. As windbreakers and soothing contributors to atmospheric equanimity they are remarkable.

Though fires burn and commercial vandals destroy millions of dollars worth of the National forest domain annually we are glad to see that Uncle Sam is doing a great deal to protect the people's heritage. Many National forests are now guarded and fostered to regulate the water flow, hold the soil, and furnish timber and wood for mining and agriculture.

In 1891 Congress authorized the President to establish forest reserves, and President Harrison created the first one—the Yellowstone—that year. President Roosevelt has done all in his power to carry out the wise provisions of the law, and there is some hope that we may undo some of the mischief of the last fifty years. If Burbank's fast-growing trees become common the work of making great forests will be accelerated, and the future American will be saved from freezing.

How Monopoly Earns Money.

We find the following remarkable summary of New York financial octopuses in the Financial Bulletin:

This department a short time ago came into possession of a circular containing some statements, which, if they are facts, are startling enough. And we have no occasion whatever to challenge their accuracy, for they conform pretty closely with other statistics on this matter.

These statements were in reference to the dividends paid by certain New York financial institutions, and bore the following figures:

The Chemical National Bank pays 150 per cent dividends (25 per cent every two months.)

The United States Trust Company pays 50 per cent dividends (25 per cent every six months.)

The Fifth Avenue Bank pays 200 per cent regular dividends (50 per cent every three months.)

The New York County National Bank pays 50 per cent dividends (25 per cent every six months.)

The Central Trust Company pays 80 per cent regular dividends (20 per cent every three months.)

The Chase National Bank has lately declared an extra dividend to its stockholders of 400 per cent.

The State Bank pays 100 per cent dividends (50 per cent every six months.) This bank has lately declared a cash dividend of 900 per cent.

The First National Bank a few years ago declared a dividend of nearly 2000 per cent. It pays a regular dividend of 32 per cent (8 per cent every three months.)

These New York City exhibits may fairly be stated to represent the profits of other banking institutions over the country—a profit made entirely out of the use of other people's money practically without interest. The "shrewd" banker busies himself with advising people of ordinary means to put their money into savings banks, loan associations, trust companies, etc., even saying that investments which promise more than 3 or 4 per cent are not safe. Yet the stockholders in his bank would be content with nothing less than 8 to 200 per cent annually.

Many dividend paying mines, which involve no more risk than the average bank, commonly pay 8 to 10 per cent on the market value of their stock. Yet the small investor must not touch these. Why? Don't you know, Mr. Savings Bank depositor, that your charitable banker should have the full use of your money while it is in his keeping, in consideration of the fact that he very generously agrees to take care of it for you (unless his bank busts, in which event he is not to blame) and return it to you when you demand it?

Let's see how it works. You have $100. The banker buys it from you for one year for $4. His actual capital involved is $4. He sells this $100 to someone else for $8 for the year. His profit is $4, which on his capital of $4 is 100 per cent. Your profit is $4 or 4 per cent. Quite a difference, isn't it? Do you wonder that banks can afford to pay their stockholders 100 per cent annually on their investment? That is what another man does with the use of your money.

The same authority referred to above states that banks can no longer be looked upon as being absolutely safe. Bank failures are quite as frequent in proportion to the number in existence as failures in mercantile lines. In the United States a bank fails about every day in the year.

The Financial Bulletin still remains firmly convinced that mining presents the best opportunities for investment to the man of moderate means, inasmuch as only the favored few are able to secure any national bank stock at prices which would afford more than the ordinary rates of interest, and we will still continue to champion the cause of the man engaged in the pursuit of creating new and untainted wealth.

A Misapprehension.

Many persons have a misapprehension concerning the fund from which Federal irrigation projects are financed. The extension irrigation projects of the Government are not paid for by a direct appropriation from the United States Treasury. The irrigation fund comes from the sale of public lands, and from surplus fees in the sixteen states and territories covered by the Reclamation Act of 1902. This fund returns to the Treasury through the payments received from settlers for water rights. This gives a sort of endless chain of funds from which the Government can draw to carry water to every foot of arid land that can be reached by water.

MONTANA PROJECTS

Huntley Project Farms Handed Out on Pitchfork

NOVEL OPENING OF ONE OF THE MONTANA SYSTEMS IS WITNESSED BY RECLAMATION OFFICIALS AND LARGE THRONG OF CITIZENS THAT CHEER LUCKY APPLICANTS.

THE Interior Department handed out homes to settlers on a pitchfork when the Huntley Project in Montana was opened last June. This was one of the most picturesque openings of a completed system and allotment of lands that has taken place since the Reclamation Service began the actual turning on of water. The day, June 26, will be a historical date in Billings, Montana, and generally a memorable one in the annals of the service.

1.—Construction work on Huntley Project, Huntley, Montana.

2.—Construction work on the main canal of the Huntley Project.

3—Canal built by government for Crow Indians, near Crow Agency, Montana.

The lands were given to lucky settlers through a picturesque process. Names of the applicants were placed in envelopes and these were mixed in a trough from which 1000 were drawn. The owners of the first 633 of these were permitted to select farm units in the order in which they were drawn.

Secretary of the Interior Garfield, Director Newell of the Reclamation Service and some lesser officials of both departments were present. The occasion was honored as a day of celebration by the citizens of Billings and neighboring towns and a large crowd turned out to witness the ceremonies.

Secretary Garfield in person opened the wide-mouthed valve that permitted the water of the Yellowstone to pour into the canal and ditches dug to distribute it over the 32,000 acres of land that had previously been virtually useless. The large crowd cheered as the first national irrigation project in Montana and the Northwest to be formally opened became an actuality.

Judge Witten Handles the Pitchfork.

More than 5000 persons registered for the drawing. After the envelopes containing their names had been deposited in the trough, Judge Witten, a dignified official of the Interior Department, mounted the platform on which the receptacle sat and with a pitchfork that had seen duty in many a wrestle with alfalfa, began a thorough mixing. The Judge didn't handle the fork like a man who had tossed much alfalfa, but envelopes were not so hard to stir about and he performed the work to the satisfaction of all.

A bright little girl then crawled upon the platform amid the applause of the throng and began drawing the envelopes, one by one, from the trough. She handed them as they came out to Judge Witten, who opened them and the names were recorded in their order. The announcement of the first name was greeted with loud cheering and the crowd kept up its enthusiasm until pretty well down the list. The selections of land were made in the order in which the names were recorded.

A list of names much larger than the farm units was drawn because there will be a number that will not homestead at all. Most of these were actuated by curiosity, wishing to see whether they would be lucky enough to draw a prize. It was found when the time for entering upon the land came that even with those not wishing to file eliminated, there were still plenty to more than fill up the units. Beginning with July 22, the owners of the first fifty names were given permission to file and fifty filings were allowed each day thereafter until the land was all gone.

The cost of water rights under this project is $30 an acre. As the lands are in the Crow Indian Reservation, the price paid for them will be higher than the government charge, or $4 an acre. There must be paid of this the first year $1, and

75 cents a year for four years thereafter. The first year and each year thereafter, until all is settled, there will be due a payment of $3 for the water right and 60 cents for maintenance of the canal. The usual commissions of the land office must also be paid the first year. At the end of five years the settlers will have all but the water right paid and that will be theirs absolutely at the end of ten years, or at the end of five if they wish to pay that soon.

It will be seen that for about $1400 each settler will receive a forty-acre farm, from which he should make from $500 to $1500 a year, according to how well he cultivates it and what crops he plants. Staple crops of beets and alfalfa should bring him close to $1000 a year. With all this he has ten years in which to make the payments, and there is no interest. Those who obtain lots in the new towns will also make a profit, for these towns will grow.

Secretary Garfield turning the water into the Huntley Canal, June 26, 1907.

Yellowstone Tapped Without Dam.

The Huntley Project embraces no dam or other expensive engineering works, except the large waterways, in which much concrete lining is employed in carrying the water around the bluffs, and there are some tunnels and one deep drop. The Yellowstone is tapped at its lower level, without even a weir dam and 400 second feet are diverted, the intake being two miles west of Huntley.

There will always be plenty of water for this project, as filings were made on 750 second feet, a great deal more than will ever be needed by the farmers. At present but a small proportion of the water of the Yellowstone is being used for irrigation or other purposes. This river, above Billings, has a drainage area of 11,180 square miles. Its headwaters are in very high mountainous, timbered country. In 1904 the monthly discharge varied from 25,972 feet to 2906 in December.

There will be thirty miles of main canal and 200 miles of laterals. The main waterway is carried along the bluffs for the first two miles. This is concrete-lined and the culverts, headgates, wastegates, syphons and crossings along it are substantially constructed of reinforced concrete. The tunnels are lined with concrete and are 9.2 feet wide and 9 feet high at the center of the arch.

From Huntley eastward the canal follows the general direction of the Burlington road to a point a little beyond the town of Ballantine, where the big drop of thirty-four feet occurs. This drop will be utilized for the working of a pumping plant which is to deliver water to a point 45½ feet above the main canal, where it will be discharged into the "High Line" Canal, which is to carry water to the Ballantine Bench and possibly to some additional lands along Fly Creek. This is a heavy lift of water and is an interesting engineering feat.

Track is Tributary to Billings.

The pumping plant is an ingenious affair and is worked by means of turbines. It is almost automatic. The water is carried through pressure pipes to two ordinary turbines mounted on vertical shafts, to which are attached pumps taking water from the same casing that incloses the water wheels. About fifty-six cubic feet of water per second are forced up the incline.

The lands under this project extend in a compact body from Huntley to Bull Mountain station on the Northern Pacific. They slope gently to the Yellowstone River, which forms the northern boundary of the project, and will be easily brought under cultivation, except a small area of alkali, 5000 acres, that will have to be flooded the first season to make it right for cultivation. The entire tract is traversed by the Burlington and the Northern Pacific roads.

At Billings, to which city the tract is tributary is located the general land office, where all filings on land in the region must be made.

The entire tract was not watered this year. A small portion was not reached, but this will be covered in time for planting next season by extending the high line and the main canals.

The survey for this project was begun in May, 1904. The work has been carried on with much speed.

The government reports give the character of the soil under this project as "light sandy loam to heavy clay" and place the value of improved irrigated land at $75 an acre.

The total cost of the Huntley Project will be about $1,000,000.

Billings, the Second City in State of Montana

THIS CITY WILL BE ONE OF THE PLACES CHIEFLY BENEFITED BY GOVERNMENT EXPENDITURE OF MILLIONS FOR RECLAMATION AND IT IS PROGRESSING AT GREAT RATE.

BILLINGS is the second city in Montana and one of the liveliest of the Northwest. The government is to spend millions of dollars on irrigation in Montana, and Billings will be one of the places chiefly benefited. It is already the central city of one important Federal project. The city is assured of rapid growth. New industries are springing up there and real estate is becoming very active. Great improvements are being made. Business men from many sections are finding openings.

The great Huntley Project, just described, is tributary to Billings. That city will be the supply depot for this area and the smaller towns it will create or advance. Important as it is, however, the government project is but a drop in the work of irrigation about this city. For years extensive areas have been producing rich crops under water developed by private corporations. Irrigation, largely, gave the city its prosperity of to-day. It is irrigation, to a great degree, that assures its future advance. The importance of non-irrigated farming in this section must not be overlooked though. Without artificial watering large crops of grain and hay are grown. Irrigation brings a denser population, but on the larger tracts of unirrigated lands, fortunes are being made. There is a great deal of this land still open for settlement. Many homeseekers are acquiring tracts of it. Fine unimproved irrigated land may be bought at low price.

Billings, seat of government of Yellowstone County, has a population of 12,225. Its altitude is 3112 feet above sea level. Its railroad facilities are remarkable, it being situated on one important transcontinental road and being the terminus of two other important systems. It is a principal shipping point on the main line of the Northern Pacific and the terminus of the Chicago, Burlington and Quincy and the Billings and Northern, the latter under construction to be completed and in operation by January 1, next year, its projectors promise.

Billings is a metropolitan place, filled with the life of larger cities. It has six public school buildings, all of modern construction, and plans have been drawn for two more. The teaching corps at present numbers fifty. There are nearly 2000 pupils enrolled. The city has all the modern conveniences and utilities, including a first-class waterworks system, two electric lighting and power plants, paid fire department, electric fire alarm telegraph, two telephone systems, complete sanitary sewerage system, well graded streets, many miles of concrete and stone sidewalks and crossings. The complete paving of the principal business section has been ordered and will be finished this year.

Electric Street Railway Coming Soon.

A corporation has been formed to install an electric street railway system on the principal streets.

A franchise has been granted to a hot water

Billings beet sugar factory, a great revenue producing industry.

heating company, construction of whose plant is under way.

The growth of Billings is a demonstration of what irrigation will do for a community. The city is in the center of an essentially agricultural region. Within a radius of fifty miles 290,000 acres are under irrigation, and systems that will cover 482,000 acres more are to be constructed. The agggregate mileage of main irrigation canals is 350. The number of canals is twenty-five. With the present acreage and that projected there will be approximately 1,000,000 acres under ditch in the Billings region. This, with the non-irrigated farming and the stock-raising industry, should raise the population of the city to 40,000. There is plenty of cheap coal, and manufacturing will develop as the population grows.

The average annual yield of alfalfa about Billings is 350,000 tons. With plenty of hay to help out range feed, this is a fine field for the stockman. Breeding of blood stock is exceptionally profitable. Thousands of fine cattle and horses and trainloads of hogs and mutton sheep, with great quantities of pork products are shipped from Billings annually. That city ships more wool than any other in the country, the record being 15,000,000 pounds in one year.

The climate of the Billings region is mild—the average winter temperature is 30 degrees, and the soil is rich. Wheat, oats, barely, corn, potatoes and all sorts of vegetables and melons thrive. Apples, pears, peaches, plums, cherries, small fruits and berries yield heavily. This is becoming one of the great fruit producing sections of the Northwest.

The sugar beet industry is at its best in the Billings country. A factory was built there last year at a cost of $1,500,000. The farmers planted 7000 acres of beets. The average yield was seventeen tons an acre and the price $5 at the station. The profit was from $45 to $50 an acre. Forty-acre tracts thus yielded about $2000 clear. The record return was $167 an acre. One farmer received $9,493.74. The factory turned out 15,000,000 pounds of granulated sugar.

Here is a list of some average yields about Billings that farmers will do well to study: Alfalfa, five to seven and one-half tons per acre; selling price $5 to $7.50 a ton. Wheat, non-irrigated and under ditch, 25 to 50 bushels; selling prices $1 to $1.25 a hundred. Oats, 40 to 100 bushels; selling price $1.25 to $1.60 per hundred. Potatoes, 200 to 400 bushels; selling price $15 to $30 a ton.

Holds Records for Great Yields.

Yellowstone County holds the record in the United States for the greatest yield to a measured acre of wheat, oats and potatoes. Last year one acre of red fife wheat returned fifty-two bushels; one acre of oats 163 bushels and one acre of potatoes, 1213 bushels. As much as 1420 tons of alfalfa have been cut from 200 acres.

Yellowstone County covers about 4,000,000 acres, much of which is in the celebrated Yellowstone Valley. Its assessed valuation is $11,550,125, an increase of 25 per cent over last year.

Billings was founded in 1882, being named after Frederick Billings of Woodstock, Vermont, one of the presidents of the Northern Pacific. The county was named after the Yellowstone River, which took its name from the ochre-tinted bluffs along its course. The assessment of property in the city reaches $3,500,000. Its bonded indebtedness is only $50,000. The total tax rate is phenomenally low. For the city it is 13½ mills, county 9 mills and State 2½ mills, a total of 25 mills. On December 1 of last year the city had on hand a cash balance of $394,057.92, of which $108,505.29 belonged to the school fund. This showing of cash on hand and small tax rate indicates a prudent and economical administration.

Among the many business industries and other institutions at Billings are three brick yards, all kept busy; seven banks, two national, with more than $4,000,000 deposits; two building and loan associations, two daily newspapers, one weekly, one semi-weekly, and a monthly magazine; five lumber companies that help out the brick men in keeping up with the demand for building material; two theaters, one opera house, seven hotels, sixteen restaurants, one brewery, one flour mill, two packing and cold storage plants, the big sugar refinery with a capacity of 1200 tons of beets a day; a creamery, one sheet iron works, two telephone companies with nearly 2000 telephones; two broom factories and three cigar, one glove and three harness factories, besides a number of others.

There are three wholesale grocery establishments in Billings, two wholesale meat and cold storage concerns, two wholesale hardware and one sash and door concern, in addition to numerous smaller jobbing enterprises.

Eleven fine churches give people of the Christian faith opportunity for devotions. The splendid public library, housed in a building costing $30,000, supplies books to the reading community.

Business Is Good in Billings.

Business of all sorts is good in Billings. The merchants carry large stocks and both they and their customers are prompt to meet obligations, the great number of farm commodities for which there is a ready market making cash plentiful. Stores, offices and residences are all occupied and there is a demand for more. Building is progressing with a rush to meet the requirements. Scores of new cottages would be snapped up at a good rental, as there is a great influx of homeseekers. The merchants of Billings draw trade from 150 miles north and south and 75 miles to the east and west. The bank deposits are increasing steadily. Everybody seems to be making money and the newcomers have no difficulty in riding with the tide. Mechanics and all sorts of laborers are needed.

Here are some of the new structures going up or just finished: A Young Men's Christian Association building, the only one in Montana, $100,000; Masonic Temple, $85,000; St. Patrick's Church, $75,000; opera house, $250,000; Northern Hotel addition, $100,000; Smith building, $50,000; new electric plant, $125,000; addition to present plant, $100,000; warehouse, $35,000; dwellings, $250,000.

Billings leads all Montana cities except one in passenger and freight receipts. Fourteen east and west bound passenger trains daily keep it in touch with the world. Its sidetrack mileage leads that of all other places in the State.

There are many enterprises in the city, manufacturing and otherwise, that would bring fortune to investors. A letter to the Chamber of Commerce will bring all desired information about Billings and the surrounding region.

The gait of the horse is whatever it is made in the training. When breaking or training the youngster is the time to set his pace, and he is a slow or fast walker accordingly when grown to service. This is a matter that should be well considered. The fast walking horse will do one-half more farm and road work than one of ordinary speed.

Sun River System Designed To Reclaim Heavy Acreage

ONE THOUSAND MILES OF CANALS AND LATERALS, HIGH TUNNELS AND LONG DAMS ARE FEATURES OF THIS IMPORTANT PROJECT WHICH IS WELL UNDER WAY.

"THERE'S nothing to it, Robbins; nothing to it. Why you can never raise anything on that bench. Along about '78 it rained and it rained. Rained all summer and you couldn't cut ha-ay, couldn't cut ha-ay. Get all you can out of it. Glad to see the money spent, but it ain't worth nuthin; ain't worth nuthin."

That's what an old-time stockman said to Engineer Robbins, when, in the employ of the Reclamation Service, he began investigation in 1904 of the bench between the Sun and Teton rivers for what is officially known as the Sun River Project.

Robbins had looked over the land some and knew of its possibilities. He told the cattleman some things he had not known about wild land, the main thing being that watering once in forty years wouldn't make even "ha-ay" grow.

1.—Showing a portion of the Fort Shaw Townsite, with the engineer's headquarters.

2.—Diversion site of the main canals, in the Canyon of Sun River.

3.—The point where Sun River emerges from the Canyon. Tunnel site No. 1, running underneath the timber and rocks shown in the picture. This tunnel is a mile long.

"Don't you know," he said, "that even when you have plenty of water to irrigate with you can't cut hay the first season on this wild sod? Look at that land close to a ditch near that you were speaking of. The first year it is irrigated, the buffalo grass grows a little taller and the blue joint begins to show a few spears here and there. The second year there is more blue joint and in some of it you can cut hay. The third year you get a hay crop. What do you judge the land for on a fall of rain once in forty years?"

Under this Sun River Project, one of the whoppers of the government schemes, 270,000 acres of land that was too high up for private capital to see a snap in the watering of it, will be brought under ditch. The system will be constructed a unit at a time and it may take several years to complete it, as the money is not all available at once. The total cost will be $7,300,000, it is estimated. Water rights will cost about $27 an acre, one of the lowest rates of all the projects.

The Sun River system embraces some stupendous work. Under one unit there will be more than 1,000 miles of waterway, including main line, main laterals, sublaterals and drains. Straightened out, they would form a cut from Montana to San Francisco, which gives an idea of the extent of ditching required for a large system. There are some big works under this project. Storage on a large scale will be an important feature and there will be three large reservoirs with high dams, one rising 213 feet, besides a diversion dam. There will be long tunnels, one of them through solid rock, that are to serve as outlets. The gorge is deep and comparatively narrow where the dams have to be put in and this gives the work a spectacular and interesting feature. On one slope will be two great pressure pipes, one 4,400 feet long and the other 3,400 feet. Across a creek will be another pressure pipe 1,500 feet long. The first two are six feet and the last one five feet in diameter. A great stone aqueduct is also to be constructed. There are varying gigantic problems under this project too for the engineers to wrestle with.

The first unit to be irrigated will be the old Fort Shaw military reservation, which was thrown open by special act of Congress for settlement under the Reclamation Act. About four sections were withheld for the Indian School located at Fort Shaw. Water will be turned on this unit in time for irrigation during the coming season.

The country embraced in the Sun River Project lies between the Rocky Mountains on the West, the Missouri River on the East, Teton River on the North and Dearborn River on the South. The valley of the Sun River proper is from one to three miles wide, and the river flows from five to twenty-five feet below its surface, lying in a rather deep channel even after it plunges from the mountain cut. Bluffs about 300 feet high border the valley. The area between these and the valley land along the stream is comparatively smooth bench. The lower valley land was nearly all under irrigation when the government began work and the summer flow of the streams all appropriated. This left for the government the storage of the flood waters and carrying of them to the higher bench land.

Investigation shows that the amount of water available for the government system is 570,000 acre feet. This is not enough for all the lands that could be irrigated were the supply larger. Because of the unsatisfactory legal condition surrounding other land south of the river, the only section on that side to be reclaimed by the government will be the Fort Shaw unit.

In 1901 a company of Helena people formed a company to construct a canal from the North Fork of the Sun River to irrigate the land between that and the Teton, but gave up the work for financial reasons, after carrying it on a short time. In 1905 a company of farmers took up the project, but after digging four of the forty miles of canal they contemplated, lack of money and the fact that the government withdrew most of the lands from entry, caused them to also give up the scheme.

The Sun River Project was approved by the Secretary of the Interior in March, 1906. He set $500,000 aside for beginning construction. Adjudication of water rights along the Sun River was begun and took up much time.

There are three large canals under the Project, the Supply, Teton slope and High Line. The reservoirs are located at Warm Springs, in the mountains above the diversion of the North Fork; Pishkun, on the bench, about fifteen miles from the mountains and Willow Creek on the South side. The Pishkun reservoir will supply the High line and Teton slope canals and the Willow Creek reservoir will supply the Fort Shaw unit and private appropriations and provide for the low water flow of the North Fork.

The North Fork reservoir at Warm Springs will store water to a depth of 180 feet and back it up seven miles. The dam and appurtenances will cost $900,000. It has a capacity of 156,860 acre feet. The river flowing through a gorge lined with granite and limestone, there is a good foundation for all the dams.

When the river leaves the mountains, it dashes over a series of falls and through a very narrow canyon. The diversion weir for the main canal will be in this canyon. It will be an arched concrete dam, resting in the limestone. Here will be a tunnel a little less than a mile long to serve as an outlet, 1,000 feet of it being through solid limestone. This tunnel branches and furnishes supply for two canals. The south line soon emerges from the tunnel and is carried across the gorge in a concrete aqueduct and around cuts in the rock to the Willow creek reservoir. Here a dam that will ultimately be 110 feet high, though only 90 at first, will hold the Fort Shaw supply.

From the canyon tunnel the north side canal follows the sidehill thirteen and a half miles to the North Side reservoir, passing through a 1400-foot tunnel. At this reservoir the water is divided to supply the High Line and the Teton canals. The former continues for more than forty miles and covers more than 90,000 acres.

The main High Line canal has two tunnels, one 2,200 and the other 2,000 feet long. There is a gradual drop of 200 feet in this canal. It is hoped to consolidate this drop at one place later and develop power.

Down on through Deep Creek, the water flows, and in this part of the system, covering 140,000 acres, occurs the great length of canal and lateral mentioned. A pressure pipe at Priest Butte will be 4,400 feet long and 9½ feet in diameter. The lower one, carrying the water under the Great Northern branch line, will be 1,500 feet long and six feet in diameter.

It is hoped to have 300 farms in the Fort Shaw unit ready for irrigation by next season. The dam and ditches for this unit are well under way. There will be nearly 4,000 farms under the project. About one-half of the land was public at the time of beginning the work. There will be fourteen townsites on this project. It lies to the West and Northwest of Great Falls.

Forage crops and hardy vegetables will thrive on this land. The winters are cold, but there are warm summers that ripen crops. Irrigated land is worth from $25 to $50 an acre. Settlers taking up government land under this project, except on the Fort Shaw unit, may have to wait a long time before water reaches it. October 1, this year, was the time set for the opening of the Fort Shaw lands. They are rich and would have been in private ownership long ago, had they not been held as a reservation.

Largest of Private Irrigation Projects in the World

NEARLY IN CENTER OF THIS GREAT HOLDING OF WATERED LAND THAT WOULD FORM RICH PRINCIPALITY IS THE PROMISING TOWN OF CONRAD.

By A. T. TAYLOR.

IT was the original intention of the publishers to describe only the Government irrigation projects in this number of Orchard and Farm. Digression in this instance is justified by the merits and magnitude of this private, and largest individual, irrigation project in the world.

Between the Milk River and Sun River government projects of Northern Montana lies an exceptional body of land, approximately fifty miles in length by ten miles in breadth. Within this area are 200,000 acres of highly productive soil, susceptible of irrigation, with an abundant water supply, only awaiting the hand of man to convert it from a cow pasture to fields of agriculture.

Not far from this historical Missouri River Falls, made famous by the Lewis & Clark Exposition, and through which country these intrepid pioneers made their way from east to west, stretches in undulating beauty the Pondera and Dupuyer Valleys. It is a significant fact that these valleys command the key to the entire watershed of northwestern Montana. The tributaries to the great Missouri River, the St. Mary River, the Milk River, and their innumerable feeders, have their sources at the back door of these valleys. Without these streams, the two government projects before mentioned, and other private projects of lesser importance, would have been impossible. A glance at the map shows these streams stretching their water tendrils over the valley like the silken webs of the spider, as though in an effort, almost human, offering their life-giving substance to the soil beyond.

In 1866, when the Indian's reign was almost undisputed throughout the length and breath of Montana, and before the buffalo had become acquainted with his long-horned cousin, the steer, that has since supplanted him, Mr. W. G. Conrad, a native of Old Virginia, at that time a youth of only 18 years, bade good-bye to the old homestead. With high hopes and an indomitable will, which has ever since been his dominant characteristic, he turned his steps toward the far and unknown West, with the territory of Montana as his objective point.

After three months' travel, undergoing all the hardships attendant upon such a journey in those days, he finally reached his destination. Without hesitation and with all the deliberation of his youthful courage and gigantic frame, he stepped forth upon the stage, the leading actor in a commercial drama which has few parallels. Success attended his every effort and today, from a small beginning, his business enterprises are so extensive and so numerous that it would hardly be an exaggeration to say he has left his impress upon every star that emblazons the American banner and upon a few of those emblematic stripes waving across the border line over the Dominion of Canada.

Conrad's Faith in Montana.

Twenty-three years ago, about the time Montana had laid aside her buckskin suit for that of the weave of the modern loom, Mr. Conrad, with the boundless faith in the future of the State, which has since been his guiding star, began the acquisition of the lands in and around the Pondera Valley, until today he is the joint possessor of 50,000 acres, and owns the Pondera Canal Reservoir, which has a capacity sufficient to irrigate this land and 150,000 acres more of government land contiguous to this princely estate. So far not one acre of the 50,000 has been disposed of. Those, however, who have exercised their desert and homestead rights in the valley are prosperous beyond their anticipations, and each farm, whether its product be barley, oats, wheat, alfalfa, or garden truck, is an indisputable evidence of the productiveness and fertility of the soil under modern and intelligent methods of farming.

The 50,000 acre tract which comprises the most desirable land in the Pondera and Dupuyer Valleys is controlled by what is known as the Conrad Investment Company. The Pondera Canal Company is an adjunct to the Conrad Investment Company. Its sphere of action and association is as follows: Its purpose is to enable the shareholders to participate in the water rights, but not in the profits of the Investment Company; its vested rights, apart from those of the Investment Company, are to store adequate water, supplied from the main reservoir, for the irrigation of 150,000 acres. This reservoir covers an area of 5000 acres, with a circumference of nearly twenty-five miles and a depth of fifty feet. Eighty miles of canal and 300 miles of laterals have been completed to irrigate 150,000 acres of government land accessible to the system, which can be acquired for 10 cents per acre under the homestead act, or for $1.25 per acre under the desert land act. Shares of water stock will be sold to the settlers, and it is estimated that the revenue from the sale of these shares alone will net the company a handsome income.

Growth of Vast Interests.

Mr. Conrad's vast business interests have grown to almost overwhelming proportions, and it has been his hand that has safely piloted the industrial craft past the shoals and breakers for nearly half a century; but now the time has come when he feels that he must minimize his responsibilities, therefore it is his intention to dispose of the Conrad investment and the Pondera Canal Company with all their associated interests, as a whole, at about one-half the price for which the lands are selling in the Government Irrigation Projects.

In the opinion of the writer, its attractiveness as an investment is unequaled, and a resume of the estate and its holdings can not fail to interest the reader; there are 50,000 acres of meadow lands which are irrigated direct; many good dwellings, barns, sheds, bridges, fences; 12,500 head of cattle, 300 head of horses; eighty miles of canals and 300 miles of laterals, and water stock ample to irrigate 150,000 acres of other land which can be taken up under the homestead, or desert land, acts. The land is the finest in Montana and the reservoir has no equal in the State.

There are three waterfalls, each over 100 feet high, which will furnish thousands of horsepower for manufacturing purposes, street cars and electric lighting plants. The land will raise from ten to twenty tons of sugar beets to the acre, for which there will soon be a ready market at $5 per ton. Mr. Conrad has already been approached by several parties who are desirous of building a beet sugar factory. All small fruits are successfully cultivated, and soon apple trees will come into bearing. Alfalfa grows abundantly upon any of the land, yielding at least six tons to the acre, which sells at Conrad for from $5 to $10 per ton; oats and barley produce from 75 to 100 bushels to the acre, and wheat from 30 to 60 bushels. Last year the newly cultivated land netted $16.66 per acre. From the forests in the mountains to the west, timber, logs, fence posts, rails and wood, have been and can be brought down the canal and distributed to all parts of the State at a very small cost. Large quantities of coal of a very fine quality can be mined upon the property.

1.—Floating timber from the mountains down the main canal near Conrad. 2.—Pondera Lake, 50 feet deep, covering an area of 5000 acres, near Conrad, Montana. 3.—Strolling through a three acre potato patch, near Conrad, Montana. 4.—Field of oats, near Conrad, Montana. 5.—Mr. W. G. Conrad, banker, Great Falls, Montana. Owner of the town of Conrad and builder of largest private irrigation project in the world. Harris-Ewing, Photo. Wash. D. C. 6.—Field of barley near Conrad, Montana. Samples from this field took the prize at State Fair. 7.—Steam plow outfit near Conrad, Montana. 8.—Street scene, Conrad, Montana. 9.—Main canal, Pondera Canal Co., Conrad, Montana. 10.—Stock yards and coal elevator, Conrad, Montana. 11.—A view on the main canal, near Conrad, Montana.

Conrad is Pretty Town.

The pretty little town of Conrad, with upwards of 300 population, and which is scarcely old enough to lisp its own name, is in Teton County, on the line of the Great Northern Railroad, which line, in the near future, will be a part of the main line of the Burlington System reaching from Chicago to the coast. The townsite comprises 720 acres platted into 5000 lots, the major portion of which, with all the lands surrounding it, are the property of the company. Lots have been sold at prices ranging from $100 to $500 each. Conrad enjoys the distinction of possessing many of the accessories and conveniences of a modern municipality. Its banking facilities are up to date in every respect, it has a fine public school, several general merchandise stores, a blacksmith shop and livery stable. Its hotel accommodations are good and preparations are now being made for the erection of a church in the near future that will cost several thousand dollars. The stock yards located here are the best and largest in the State and the imposing coal elevators of the railroad company are not excelled by any others of the system.

When the 200,000 acres of land which surround the town have been brought under cultivation by the extension of the Conrad Canal Company's irrigation system, and when this land is subdivided into farm units of, say eighty acres each, it will aggregate in round numbers, 2500 farms. The town of Conrad will be the base of supplies and the distributing point of all this great commonwealth of agriculture. These are embryonic facts which are as sure of materialization in the near future, as is the sun to rise upon the morrow.

Two Days' Ride Over Project.

Accompanied by Mr. M. S. Darling, Mr. Conrad's engineer, the writer rode for two days over the entire project; up hill and down dale, by crystal streams and roaring rivers, o'er grassy slopes and mossy meadows, and round the lake which forms the Pondera reservoir. Here among the green hills, almost within view of the town of Conrad, nestles this magnificent body of water like a monstrous sapphire, challenging in beauty the blue of heaven's dome. The ever-changing scene was heightened by the fantastic coloring of nature's own design, and looking from the hills above, it seemed to pass like a glorious panorama from sunny slope to mountain top, before the range of vision.

In reviewing the beauties of this pastoral landscape, how the mind kindles at the thought of the possibilities here awaiting the genius and ambition of such a man as Andrew Carnegie.

To build and own a city around which are clustered 2500 prosperous farms; to see broad avenues lined with beautiful trees; to see the friendly lights gleaming from the windows of thousands of happy homes on a starless night; to hear the whir-r-r of the electric car and the hum of the factory wheel, and to know that all this had been made possible by your own unaided efforts should be sufficient reward to satisfy the ambitions of a Caesar.

For one of our many millionaires who is striving to do some laudable deed which will perpetuate his memory after he has passed into that great silence, here is an opportunity that would mark one of the grandest achievements the world has ever known and would be a crowning glory in his closing years—a tribute to the magnanimity of the man.

The process of conditioning of a lot of fowls intended for the market should be begun by confining them in a pen or yard to themselves. Any attempt to fatten for market by feeding the laying hens with others will result in making the laying hens too fat for profitable work as egg producers.

A small yard will serve to fatten market fowls, as they will not increase in weight if confined in a small coop or box. When a number are together they will be contented, and by feeding them four times a day, allowing variety of fattening food, they should be in fine condition in about ten days.

Waters of American River to be Diverted through Canada

UNDER BIG MILK RIVER PROJECT WHICH WILL IRRIGATE BLACKFEET INDIAN RESERVATION AND OTHER LANDS, CLAIMS OF TWO NATIONS TO FLOW OF STREAMS MUST BE ADJUSTED.

THE Milk River Project in Montana carries with it an international difficulty that the diplomats of Canada and the United States are evolving a solution for. The water of two rivers that rise in the United States, but flow into Canada, where they supply irrigation works in Alberta, must also supply the Milk River area in this country. Some irrigating canals in the United States are also supplied by these rivers. To protect these vested rights, give Canada what she is properly entitled to and still develop enough water to cover the immense area of tillable land along the Milk River, is the problem that the engineers have to deal with under this project.

There is a strip of country 150 miles in length along the Milk River that it is hoped to irrigate from this and St. Mary River. There will be from 175,000 to 200,000 acres brought under ditch, according to the amount of water that can be obtained.

This is one of the most important of all the projects, even for Montana, the scene of large ones. It will cost finally about $4,500,000 and the price for water rights is expected to be about $26 an acre. This project will not be completed for some years though $1,000,000 has been set aside for the building of the St. Mary canal, from St. Mary River to the North Fork of Milk River, a distance of twenty-three miles. This will divert the water of St. Mary River and permit it to run through Canada and then into the Lower Milk River in Montana. This is a rather expensive piece of work, but of all the plans investigated it proved to be the best. The main supply of water will come from the St. Mary.

There will be 50 per cent of public land under the Milk River project, which makes it an attractive one to homesteaders.

St. Mary River rises on the eastern slope of the Rocky Mountains in Montana and flows northward into Canada, where it empties into the Saskatchewan River, whose waters are lost finally in Hudson Bay. Milk River has its source in the rolling country lying immediately east of the St. Mary Basin, in the United States. Its two forks, North and South, flow northward into Canada, uniting there and continuing as Milk River proper in an easterly direction for about 100 miles and then re-entering the United States where the river joins the Missouri.

Lakes Serve as Reservoirs.

Lower Milk River Valley has a range of elevation from 2100 to 2500 feet and is well adapted for irrigation, the only difficulty being the development of a proper water supply. Milk river is deficient in this respect and it is because of this that it is proposed to divert the flow of St. Mary River into the headwaters of the first mentioned stream. To do this it will be necessary to store the waters of the St. Mary.

The location of the St. Mary Canal was begun in 1906, before the snow was off the ground, and the work was finished before the end of the season. The canal is planned to have a capacity of 850 second feet. Specifications were prepared and bids asked for the contract of constructing the first fifteen miles of the canal. The last eight miles will be built by the government, the laborers being Indians, employed by arrangement with the Indian office.

A portable sawmill has been erected by the government at the foot of Lower St. Mary Lake and a contract entered into for the delivery of logs from the Lewis and Clark Forest Reserve, near by. This is another example of the utility of the forest reserves. The law permitting timber to be taken from them for government use will save the people a large amount of money on this project. The Reclamation Service has also had thirty-six miles of telephone constructed. It may be said that the project is well under way. No allotments have been made, however, or authorization given for the construction of any works in the Lower Milk River Valley.

The storage reservoirs will be at St. Mary Lakes. The first plan involved the construction of an earthen dam fifty feet in height. Later consideration was given to the construction of a dam between the lakes or at the outlet of the upper lake. There will probably be more than one dam. The one at the outlet of the lower lake will be 1600 feet long on top and 31 feet high. Its capacity will be 150,000 acre feet. The total storage will be 587,000 acre feet.

A large part of the Blackfeet Indian Reservation will be irrigated under this project. There are 70,000 acres in this reservation. It may be possible to obtain a water supply for much of the reservation land and other areas adjoining by a diversion of Cutbank Creek at a point about seventeen miles west of the town of Cutbank. It is thought there is enough water in this stream to supply a canal with 250 second feet.

International Canal is Suggested.

The Canadian officials suggested an international canal from St. Mary River. It would head at what is known as the Paisley dam site, about three miles south of the international line, and run into Canada, from which it would swing back into the United States, after a distance of eight miles, finally ending in Canada again—in Whiskey Gap. Estimates show that this canal would be somewhat cheaper of construction and maintenance that that of the upper line.

The general plan for the irrigation of the Lower Milk River Valley contemplates the construction of what is known as the Chain Lakes reservoir, the upper end of which is only a few miles below the international line. It will store the flood waters of the Milk River and any of the stored waters of St. Mary River that may be necessary. The water will be turned out of the reservoir and permitted to continue down the main channel of Milk River. Two diversion systems are planned for the valley, the Chinook, comprising the Chinook North and South canals, and heading near the town of Chinook, and the Dodson system with two canals, one from each side of the stream, heading twenty-two miles west of Malta.

The Milk River Project lies in Choteau and Valley Counties. The maximum temperature is 105 degrees, minimum 45 and mean 42. The average rainfall is thirteen and a half inches. The principal products are hay and grain, though fruits and vegetables thrive. The Great Northern Railroad traverses the section, there being thirty-two stations within the project. "Sandy loam and gumbo" is the description of the soil. Value of irrigated land is given at $35 to $40 an acre. Two feet of water per acre is required for irrigation.

Marias Project Separate Unit.

An area that was deemed a part of the main Milk River system when the investigation began developed into such importance that it was determined to consider it separately. This is what is now known as the Marias Project. It may develop into one of the biggest of all the systems. The engineers have some difficult problems in connection with it, though. They must either build an earthen dam of unprecedented height to secure a diversion of sufficient elevation to serve all the lands, or must install an elaborate pumping system, using power from whatever dam may be constructed. It is probable that pumping will be resorted to, as a very high dam will be constructed in any event and electric power can be generated from this.

By making the Marias a separate source of irrigation supply it is thought that nearly 200,000 acres additional can be irrigated. Most of this area lies immediately west of Big Sandy Creek.

The most important reservoir site for this has been found at Two Medicine Lake, in the upper part of the Marias Basin. The Two Medicine River would also augment the water supply by 100,000 acre feet annually. The best location for a dam was found to be in the sandstone canyon of the Marias. There is also a natural dry depression known as Lonesome Lake, in which 200,000 acre feet could be stored. To use this site it would be necessary to construct an embankment 24,000 feet in length—nearly five miles—and twenty-four feet high. It would be like a section of the great wall of China, only of earth. All these various features are being studied by the Service. The estimated storage obtainable is about 600,000 acre feet.

The main canal must have a heading in the Marias, 195 feet above the bottom of the stream and it is planned to erect an earthen dam 150 feet high and pump the rest of the forty-five feet.

If your poultry house floor is earth, remove several inches and spread it over the garden. The results will be astonishing to one who has never tried this plan. Hen manure is many times more valuable for fertilizing than the common barnyard product, and it will pay to save it for this purpose. Even if it can be obtained only in small quantities, it will to that extent help to make the garden more productive.

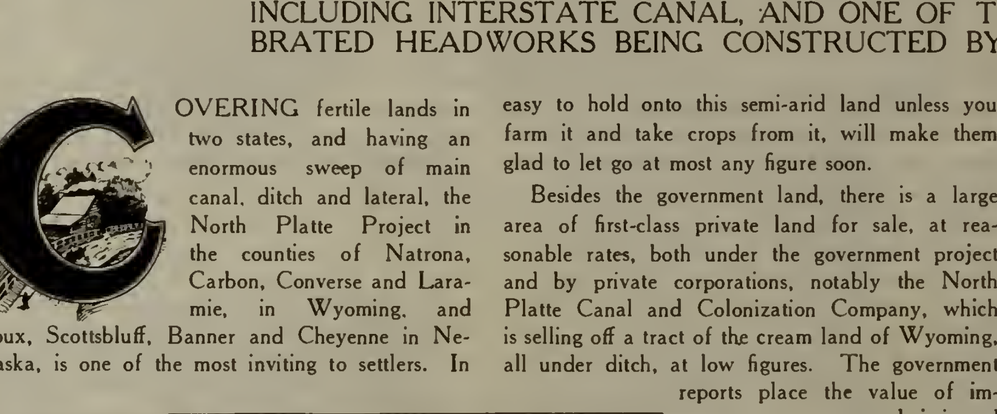
Reports say that Clinton H. Willis, of San Jose, has bred a chicken that can talk and its vocabulary of swear words is daily increasing. It is a cross between a guinea hen and a parrot.—Exchange.

NEBRASKA AND WYOMING PROJECT

Large Pathfinder Dam Forms an Immense Reservoir

NORTH PLATTE PROJECT EMBRACES SOME FAMOUS FEATURES, INCLUDING INTERSTATE CANAL, AND ONE OF THE MOST CELEBRATED HEADWORKS BEING CONSTRUCTED BY THE SERVICE.

COVERING fertile lands in two states, and having an enormous sweep of main canal, ditch and lateral, the North Platte Project in the counties of Natrona, Carbon, Converse and Laramie, in Wyoming, and Sioux, Scottsbluff, Banner and Cheyenne in Nebraska, is one of the most inviting to settlers. In fact almost all the public land under it has been taken up, though water will not be turned on fully until next season. The government land constituted 65 per cent of the tract.



1.—Rock at Molly Fork, Wyoming, on Whalen canal, showing nature of cut and the Burlington R. R. coming in close connection with the canal.
2.—Interstate canal. Spring Canyon flume from northwest.

The filings need not deter other settlers, however, for it is predicted that half of the land will be open for location again before the end of next year, or that, at least, relinquishments covering half of the public domain will be for sale at reasonable figures. This is because many of those that have filed have done so for speculation, hoping to sell to bona-fide settlers. They saw the land was desirable and figured on good profits by forfeiting their homestead rights. The fact that it is not easy to hold onto this semi-arid land unless you farm it and take crops from it, will make them glad to let go at most any figure soon.

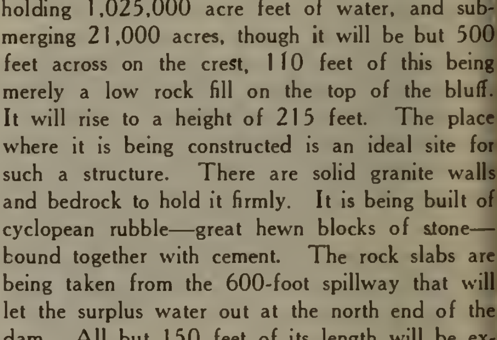
Besides the government land, there is a large area of first-class private land for sale, at reasonable rates, both under the government project and by private corporations, notably the North Platte Canal and Colonization Company, which is selling off a tract of the cream land of Wyoming, all under ditch, at low figures. The government reports place the value of improved irrigated land in this region at $40 to $75 an acre. It should reach a much higher value than that under full development.

The Famous Pathfinder Dam.

Two of the striking features of this interstate project are the great Pathfinder dam, sitting inside a rock cleft, and a main canal 100 miles long. Approximately 125,000 acres will be watered. Of this 35,000 acres constitute a unit that may not be put under ditch as soon as the other portion of the tract, as a wait will be made until more money comes into the reclamation fund before the water is extended to it. Water has been applied already to about 5000 acres and for the season of 1908, when the project will be formally opened, about 25,000 acres in Wyoming and 80,000 acres in Nebraska will be covered. All that remains to bring this much land under water is the completion of the second section of the main canal, which should be ready by next May. The progress being made indicates that they will be completed before then.

Ninety-five miles of the main canal, about half of which is in each of the states embracing the project, have been completed. There will be 950 miles of canal and lateral.

The Pathfinder dam will create a reservoir holding 1,025,000 acre feet of water, and submerging 21,000 acres, though it will be but 500 feet across on the crest, 110 feet of this being merely a low rock fill on the top of the bluff. It will rise to a height of 215 feet. The place where it is being constructed is an ideal site for such a structure. There are solid granite walls and bedrock to hold it firmly. It is being built of cyclopean rubble—great hewn blocks of stone—bound together with cement. The rock slabs are being taken from the 600-foot spillway that will let the surplus water out at the north end of the dam. All but 150 feet of its length will be excavated from the solid rock. The spillway will have a discharge capacity of about 43,000 second feet. The lifting of these big blocks of stone into their places in the dam is done with great derricks, the lift from its top growing greater and greater as the dam grows, though of course most of the material can be dropped into place from the point of excavation at the crest of the cliff. The dam is to be 100 feet thick at the bottom and ten feet at the top. It will contain 55,000 cubic yards of masonry. The outlet for turning the water into the canals is through a tunnel beginning at low water mark. It has been bored largely through



Pathfinder Dam, showing heavy construction work.

solid rock and is now letting the river through to the main canal. The headgates and other such works are to be of reinforced concrete. The whole will form one of the strongest, most compact and permanent works of this nature ever constructed. Water users should not have a large bill for maintenance when they finally obtain the system as their own.

Army of Men Places Stone.

The building of the Pathfinder dam, with the work of putting the blocks of stone into proper place, carried on by an army of men that look like ants beside the immense chunks of stone and the wall of masonry that is rising in front of the stream, must be like the erection of the pyramids of ancient Egypt, except for the steam engines, derricks and other modern devices employed. The dam builders of the twentieth century have as gigantic a task to accomplish as did the men that raised the enduring monuments in the land of the Pharaohs.

The contractors began work on the dam on September 25, 1905, and have continued it without interruption ever since. They have established a permanent camp near the work and installed an efficient plant. Eight derricks are in use at the dam and two at the spillway. A cableway across the canyon at the dam site furnishes communication between the top and bottom and delivers stone, concrete and mortar to the derricks on the wall. Continued high water prevented the laying of masonry during the spring and early summer, when the floods occurred, but after that the real construction work proceeded rapidly. It is hoped to complete the dam by November 1 of next year.

The Pathfinder dam is located on the North Platte, three miles below where the Sweetwater river joins it. The reservoir will extend twenty-three miles up the North Platte and fifteen miles up the Sweetwater. The maximum width of the reservoir will be about four miles.

South of the dam the rock surface drops rapidly and an earthen dike 1400 feet long, forty-one feet high and with a width of twenty feet will be constructed to retain the water on that side.

Interstate Canal a Notable Feature.

The capacity of the big interstate canal is 1400 second feet at the headworks and 1200 second feet at the end of the forty-fifth mile. This part of the canal is virtually a useless stretch of waterway. It is constructed through rough country and picks up but a few acres of land for redemption from aridity. The capacity at the ninety-fifth mile is 700 second feet. Then there are four and one-half miles of connecting canal with a capacity of 500 second feet.

The water, after leaving the reservoir through the tunnel at the base of the dam runs for a short way through the North Platte again to a point where a diversion dam of concrete, 325 feet long, lifts it again and turns it into the interstate canal. From the southern end of this diversion dam will extend an earthen embankment, 2000 feet long and with a maximum height of 18 feet.

There are several thriving towns in this irrigation area near the end of the original Farmers Ditch, Mitchell and Wyncote, where the North Platte Canal and Colonization Company has its headquarters, being the leading centers. There is much land under irrigation outside of the government project, for in this rich section private capital has been active. The North Platte Canal and Colonization Company has the cream of this and receives water from the government reservoir through the Whalen canal. Elevation is from 3800 to 4200 feet. The rainfall is sufficient for profitable dry farming, being from 9 to 18 inches. The maximum temperature is 100 degrees, the mean 45 and the minimum only 20. The soil is a sandy loam, according to the government investigators who report that the principal crops are alfalfa, cereals, corn, sugar beets and potatoes. Fruits, berries, vegetables and melons also thrive in this section.

Work Progresses with Smoothness.

The lands to be irrigated lie on the north side of the North Platte and are traversed by the Burlington and Missouri River Railroad. The Union Pacific has a line along the west side of the North Platte and Laramie rivers projected and will begin construction soon. Denver, Omaha, and central Wyoming furnish extensive nearby markets.

It has been estimated that two feet of water is required to the acre here. There will be plenty for this service after all vested interests are served. There is a watershed of 12,000 square miles above the dam and the estimated run-off from it is 3,000,000 acre feet a year. This leaves plenty of room for evaporation. An abundance of water is assured under this system.

1.—View showing the North Platte River just below the diversion dam site at Guernsey.
2.—Pathfinder Dam, Wyoming. Laying first stone.

Work has progressed smoothly on all parts of this system. The contractors have carried on operations on the several sections without hitches and the government has not been compelled to relieve any of them of their tasks.

The farm units here are eighty acres. There is little, if any, brush to be taken off and leveling is inexpensive. The receivers' and registers' fees are only $7 for eighty and $14 for 160 acres. Water rights will be about $35 an acre.

Eucalyptus for Railroad Ties.

The following dispatch that appeared in the daily press recently should set the farmers in those Western sections where the eucalyptus will thrive to considering the possibilities of that tree as a medium of profit:

Hilo, Hawaii.—The largest contract ever made in this territory has been signed between the Hawaiian Mahogany Lumber Company and E. W. Faulkner, representative of the Atchison, Topeka and Santa Fe Railroad Company, for 90,000,000 feet of ohia lumber, which will be cut into 2,800,000 ties and delivered within two years. The price is $2,000,000 at the rate of 71½ cents a tie.

This contract means that more than 1,400,000 ties must be delivered in a year, or at the rate of 117,500 ties a month. A railroad line will be run into the forests to haul the ties.

It is understood that the Santa Fe will make its own arrangements for shipment and probably will bring from fifty to seventy-five vessels to Hilo for their freight.

Incidentally this big contract will mean the establishment of small industries to utilize the by-products for the shipment of firewood for making telegraph and telephone pins, charcoal, wagon parts and arms for electric light, telegraph and telephone poles.

It has been said that a eucalyptus tree, planted in proper soil in the climes where that tree will grow, will attain a size in from three to four years that will give four railroad ties. How many trees will grow well upon an acre of land, the practical farmer knows. If the ties are worth 71 cents in Hawaii, they must be worth more here, granting that the eucalyptus makes as good a tie as the Island timber that is to be utilized. It has been said that from $2000 to $2500 can be made from an acre of land in from three to four years by producing eucalypti for ties. This is about $700 an acre a year, for the care of the trees, once they are started, is inexpensive. Even if these figures should be large, the correct ones are surely of sufficient magnitude to show heavy returns.

Experts have demonstrated the value of the wood of the eucalyptus. They even say that it can take the place of hickory for the making of implement handles, wheel parts and other things needing hard wood. It is said to make an excellent railroad tie. Railroad companies are already pressed for a supply of ties and the great amount of new line construction in the next few years will make their needs still greater.

When ants are troublesome sprinkle sugar through a small piece of sponge and leave these about the pantry shelves. In a short time the ants will be holding a high carnival. Plunge the sponges in boiling water and set again.

Beautiful North Platte Valley in Nebraska and Wyoming

MITCHELL, THRIVING YOUNG CITY THAT IS GROWING UNDER THE INFLUENCE OF WATERED LANDS, IS IN CENTER OF THIS WONDERFUL RECLAIMED REGION.

IN the history of the development of irrigated sections the valley of the North Platte River, in western Nebraska and eastern Wyoming, affords one of the most striking examples to be found anywhere in the world of the actual creation of wealth by the magical means of irrigation.

A century ago the old Oregon trail led through this valley, inhabited only by Indians. Adventurers bound for the then unknown northwest were the only white men who set foot there. The Hudson Bay Company had a trading post at Fort Laramie, Wyoming, and occasionally there was communication between such remote outposts and the settlements of the east. In the early part of the nineteenth century Washington Irving went along this trail and in his book describing the adventures of "Captain Bonneville" he tells of the beauty of the hills that border the North Platte Valley.

For the greater part of the century there was no habitation here but that of the red man, but in the early '80s there was a rush of settlers to this section. There was nothing here but a sandy soil, sparsely covered with grass. The immense range was suited for cattle ranching and this country became the dwelling place of the rancher and cowboy; and so it continued another quarter of a century. Land was worth practically nothing in small tracts, for, while the soil was rich, there was a lack of rainfall and agriculture was out of the question. But one day somebody got to thinking about the great volume of water that flowed down the North Platte river while the land on either side of it was suffering for moisture, and the salvation of the North Platte Valley was begun. Small irrigation projects were devised, the settlers banding together and digging their ditches, taking the water from the river. In this way the land that was a very uncertain venture for agricultural purposes became the surest as well as the richest farming territory to be found anywhere and soon reached a value of $60 to $75 per acre. More and larger irrigation enterprises were undertaken and put in operation until all the land on the lower levels near the river was under irrigation and cultivation.

At this point the modern chapter begins. The United States government took a hand in the proceedings and projected the great Pathfinder dam and the Wyoming-Nebraska Interstate Canal. The source of the North Platte River is in the Rocky Mountains of Wyoming. Every year an immense quantity of flood water comes from the mountains as the result of the melting of the winter snows, and flows down the streams to wash out bridges and railroad tracks and flood the towns and country down toward the Missouri River. But after the spring floods, the North Platte River is low and the water supply is too limited for the gigantic irrigation system projected by the government. So the United States engineers went up into the mountains of Wyoming and constructed an immense dam across a mountain gorge, at a cost of $1,000,000, thus creating a reservoir in which the flood waters of the spring season are backed up and stored to a quantity of 1,000,000 acre-feet, or water enough to cover a million acres with a foot of water. Then, at an expense of several more millions, the government constructed a great canal 150 miles long by which the water is conveyed along the range of hills that borders this valley on the north and is distributed to every 80-acre tract of the immense territory of fertile land lying below the canal. Thus a great territory has been transformed from land that was good for nothing but grazing into land that is worth $100 per acre, and this land is given away to homesteaders by the United States government. The only condition attached to the gift is that the settlers shall pay the cost of constructing the irrigation system, which amounts to about $35 per acre. To pay this, the homesteader is given ten years' time, paying $3.50 per acre per year; and at the end of ten years he owns the land and has the water free forever. During the ten years the government keeps the canal and laterals in repair and pays the cost of maintenance. And the settler is charged no interest.

Settlers Coming in Droves.

With such inducements it is not a matter of wonder that settlers should be pouring into this valley in droves from all parts of the United States. The lands that were unbroken prairie a year ago now look like settled and prosperous farming communities—and they are. Naturally, with such an attractive proposition offered the homesteader, the country has been settled by the better classes of farmers; and instead of the poverty-stricken fortune hunters who commonly drift to newly opened homestead lands, we have here capable and progressive farmers—many of them men who have sold a $15,000 farm in the crowded districts "Down East" and have the money in the bank. When you can get $100 land for $35 an acre, and get it on ten years' time without interest, it is a business proposition that appeals to most anybody.

With the country settling so fast, it is only natural that the towns should also have grown correspondingly. The government headquarters of construction and administration of this project are located at Mitchell, Neb. Before the coming of the government work, Mitchell was already a prosperous and growing town, but it has more than doubled in population and business since the United States Reclamation Service began operations in the North Platte Valley. And it is still growing. All through last winter people were living in tents and barns and shacks of all kinds because the builders could not keep up with the increase of population. Mitchell's age is only seven years, but its oldest bank has assets of $275,000 and its largest store does a yearly business of more than $150,000. The town is situated on a branch of the Burlington railroad, which will be a main line as soon as the Burlington completes the extension which is now projected west from Guernsey, Wyoming. The Union Pacific is also headed for the North Platte Valley, running its main line through here, by which it will shorten the distance from Omaha to Ogden something like 50 miles less than its present main line by way of Cheyenne.

Other Irrigation Systems.

But the government irrigation project is not the only one in the North Platte Valley. Many thousands of acres are now irrigated by private ditches, owned by associations of farmers. The Tri-State Land Company, a corporation of which Edward A. Cudahy of the Cudahy Packing Company of Omaha is president, has just finished constructing and will immediately have in operation a large irrigation ditch, with a top width of 100 feet, taking its water from the North Platte River. From this ditch the Tri-State Company will water its own extensive land holdings and also sell water rights to land owners whose farms lie under its ditch.

Another Government Ditch.

The government canal now being completed is on the north side of the North Platte River. But on the south side of that river is also an immense territory of rich land that needs only water to make it as productive and valuable as the north-side land. Accordingly, the Pathfinder dam and reservoir have been constructed so as to accommodate two canals, the one on the north, which has been put in first and the one on the south which is soon to follow. The plan of the government is to get the north-side ditch in operation and get some revenue coming in from the yearly payments of the homesteaders of the irrigated land before beginning the construction of the canal on the south side. However, it is only a question of a very few years until the twin sister of the present great canal will be started on the other side of the river, and this will again double the rate of development of the North Platte Valley.

Soil and Climate Excellent.

The climate here is peculiarly healthful and agreeable. The altitude is 4000 feet—high enough to insure clear and invigorating atmosphere, delightful days and cool nights in summer. The winters are very mild and of short duration. Such a thing as any form of lung trouble is altogether unknown, and all in all a more healthful climate the year round can not be found in the world.

The character of the soil can be judged from what it produces. The irrigated land here yields twenty tons and more of sugar beets to the acre; 100 bushels of oats; from 200 to 400 bushels of potatoes; forty bushels of wheat; eight tons of alfalfa, and other products proportionately. Some exceptional yields have run much higher than these figures, but these are such as can easily be substantiated by numerous examples any year. The soil here is much the same as that in the Fort Collins irrigated district of northern Colorado.

Water Supply Unlimited.

One handicap which is usually met in irrigated countries is not a factor here, and that is shortage of water. The reservoir which supplies the government irrigating system holds 50 per cent more water than the highest possible requirement of the land that is irrigated; and as long as it doesn't quit snowing in the Rocky Mountains in the winter time there will be no lack of water to fill this

SCENES SHOWING PRODUCTIVENESS OF

WONDERFULLY FERTILE

AGRICULTURAL REGION

SURROUNDING MITCHELL, NEBRASKA

reservoir every spring, and when filled it will hold a two years' supply of water.

Wonderful Future Assured.

There can be no question that this district is destined to be one of the richest sections of the United States in a very few years. This is not a matter of speculation, but of certainty. There is no uncertainty about an irrigated region—neither drouth nor panic can touch it. The North Platte Valley is one of the greatest irrigated districts in the world and those who have got in early will reap a rich harvest.

The population is growing fast and there are openings there for professional men, tradesmen, and business establishments. A great field of investment is open. Any who are interested should write the Mitchell Commercial Association, Mitchell, Nebraska.

NORTH PLATTE CANAL AND COLONIZATION COMPANY

IT IS OFFERING FERTILE IRRIGATED LANDS IN THIS BEAUTIFUL VALLEY AT THE LOWEST RATES AND FORTUNE AWAITS FARMERS THAT ACQUIRE THEM.

By A. T. TAYLOR.

FIFTY-FIVE years ago near the close of a sultry summer day a small band of immigrants wearily wended its way into the valley of the North Platte. Tents were pitched, the jaded oxen unyoked and preparations were made for a two weeks' rest for man and beast.

1—Home of Edward H Reid at Valley View Ranch, where are located main offices of North Platte Canal and Colonization Co., near Wyncote, Wyo.

2---Alfalfa Stacking

4.—Dorothy and "Reggie."

The valley then, as it is today, was luxuriant with succulent and nutritious grasses, and buffalo and other wild game were abundant. When, at the expiration of two weeks, the stock had recuperated their strength and a sufficient supply of buffalo meat had been obtained, the caravan moved forward to California, the El Dorado of golden dreams.

Among that company of gold seekers laboriously plodding toward the setting sun was the father of the writer, who has long since passed beyond the Great Divide, and whose remains today are quietly resting near the entrance of the Golden Gate, that lets the world's commerce into San Francisco Bay.

Doubtless the thought never entered the mind of that hardy pioneer, that after the lapse of over half a century a son of his should gaze upon this beautiful valley in wonder and astonishment at the marvelous transformation that is being wrought by money and the genius of man—the wonderful metamorphosing of these primitive prairies into prosperous villages and luxurious homes.

Crossing the Interstate Canal at Valley View Ranch during low water, summer of 1906, near Wyncote, Wyo.

There is a touch of pathos in picturing the West that was; but after all, the trend of man is forward. It is an indisputable fact that man's ambition, like the sun, must rise anew each day. The law of nature has ordained that we must forge ahead to higher ideals or retrograde to the habits of the savage.

The human tide of immigration which seems ever flowing toward the West in demand of its rightful heritage of health and home, has here entered into a friendly partnership with nature, and today this beautiful valley of the North Platte, that was but a few decades ago the home of the Indian and the range of the buffalo, is the scene of all the activities and progress of modern civilization.

Lying within the North Platte Irrigation Project, near the village of Wyncote, Wyoming, situated on the Burlington railway, which now traverses the North Platte Valley and parallels what was known as the "Old Mormon Trail," that was for many years the overland route from the Missouri river to the Great Salt Lake and the Pacific coast, is the North Platte Canal and Colonization Company's colony. The lands of this colony comprise 20,000 acres of the finest and most productive soil in the United States. Its fertility and the climatic conditions, and particularly its close proximity to the eastern markets make it extremely attractive. It is part of the government project, with prior rights.

The writer having personally visited the projects of New Mexico, Arizona, Oregon, Washington, Idaho and Colorado, and considered the merits of each—and there is no doubt that each project has its share of merit—says with a feeling of fairness to them all that the North Platte Canal and Colonization Company's claim that it offers terms to the settler that are both extremely cheap and attractive, is true.

Sugar Beets Hold World's Record.

Sugar beets raised in this valley hold the world's record for the amount of saccharine matter contained, and were its resources limited to sugar beets alone, this land should be worth at least $200 an acre as soon as factories were established for handling the product. Companies are now being organized for the erection of two or more factories, and within a year from this date, the manufacturing of sugar in the North Platte Valley will have emerged from its embryo state to a reality, and hundreds of farmers will be busily engaged in sugar beet culture.

The one dominant point in favor of this project, which should be ever present in the mind of the settler, is its nearness to eastern markets and its consequent great advantage in the matter of railroad rates over other projects in the farther west.

In 1903 Mr. H. D. Lingle of Chicago undertook to finance and carry through the project, since which time he has been president of the company. It is known as the North Platte Canal and Colonization Company.

Before entering into the details governing the purchase price, water rights, products, etc., of land in this colony, a brief description of the home life of those who have already become residents may be of interest to prospective settlers:

Mr. Ed H. Reid, vice-president and general manager, has allotted to himself the laudable task of making this the model colony of the West and the crowning glory of his life's work. As an incentive to his neighbors, he has erected for his own use a magnificent home, that would be a credit to any city; also houses for the comfort of his employees, and all other accessories and conveniences to be found in conjunction with the residence places of the most cultured and refined families of older localities. The house sits upon a rising slope overlooking the valley of the North Platte, north and south, presenting an enchanting landscape of rugged mountains and emerald fields, throughout which the eye is ever discovering some new object of interest.

1---Dining room, Valley View Ranch, near Wyncote, Wyo. 2.—Living room, Valley View Ranch, near Wyncote, Wyo. 3.—Living room, Valley View Ranch, near Wyncote, Wyo. 4.--U. S. Engineers' camp at Wyncote, Wyo. Daughters of Engineer Weiss and Miss Jessie Reid at the right. 5.—Dorothy Reid and her playmates, burro and bull terrier. 6.---First completed section of North Platte project, 34 feet on bottom, 64 feet on top, 13 feet deep. Mr. Reid's daughters in foreground.

Mr. Reid's family is the living evidence of the fact oft proclaimed, that the present generation is becoming more and more adapted to the beauties and advantages of the simple country life upon the farm. Here contentment, harmony, refinement and industry walk hand in hand, and could such a condition have existed among the farmers of our forefathers, it is safe to say that the sons and daughters of those days would never have deserted the farm for the sordid and soulless life of the city.

Among his neighbors, Mr. Reid numbers men of large commercial enterprises and those of various professions, all of whom have found the cultivation of the soil more attractive than the labors of the office.

Employees have Personal Interest.

It has been Mr. Reid's purpose to so arrange it that each of his employees shall have a personal interest in the work, which he performs, other than only in the monthly salary which he receives and by this method the employee is made to feel that he is on a social equality with his employer. The plan so far has worked out admirably, and a happier, more self-satisfied and contented people, would be hard to find.

A few years hence, the West of today will hold the balance of population and among the men who still remain to mark this change, the oft repeated story heard in older communities will be told again, "Twenty years ago I could have bought that farm over there for $30 an acre, now it is worth $200 per acre, and I doubt whether you could buy it for that." And so the "winning of the West" goes on.

The North Platte Canal and Colonization Company's land is located in the extreme eastern part of Wyoming, in the North Platte valley. The bottom lands have been irrigated for a numbers of years, as they were easily and cheaply reached by small ditches. The bench lands lying from seventy-five to eighty feet above the river bottom required the expenditure of a large amount of money and the construction of expensive irrigation works. Private enterprise being unable to cope with the difficulties, the rich uplands remained unreclaimed for many years.

Under the "Carey Act" it became possible for a company to construct a canal and be assured of the financial safety and feasibility of the enterprise. This act, the most liberal ever passed by Congress, has made possible the reclamation of a vast area in Wyoming, and the other arid states which otherwise would have remained desert.

The Carey Act Explained.

The Carey Act, more correctly known as, The Act of August 18, 1904 (28 stat. 372-422) authorizes the President to contract with any state in which desert land may be situated binding the United States to patent to the State free of charge not to exceed 1,000,000 acres of such desert land as the state might cause to be irrigated, reclaimed and occupied. The state may enter into contract with private parties to irrigate the land. An essential part of the contract is an agreement on the part of the person or corporation building the works to furnish water to the settler within a certain time, to charge not more than a certain amount, for water rights, maintenance, etc., and providing for the ultimate transfer of the irrigation works to the water users.

These charges and conditions are fixed by the State and protect both the settler and the investor. The investor can not charge exorbitant prices, the settler cannot obtain land without first agreeing to pay a reasonable price (as fixed by the state) for water.

How to Obtain Land.

Under the Carey Act the settler first makes a contract with the irrigation company for water. He registers this contract with the State Land Board, pays 50 cents per acre for the land selected and a fee of $1, making a total of $81 on a quarter section. On presentation of proof that he has occupied and actually irrigated one-eighth of the area, he gets a patent for his land. The method of obtaining patent to the land has been divided by the State in three classes or options.

First—If within six months after filing on the land the settler has built a suitable house and resided therein at least thirty days, and if he has reclaimed one-eighth of the land, and has a crop growing thereon, he can make final proof and obtain title to the land.

Second—If proof is not made within six months, one-half of the land must have been reclaimed and have crops growing thereon, and a continuous residence of thirty days shown before the settler can make proof. This proof must be made within one year from date of filing.

Third—Should the settler not wish to prove up under either of the above conditions he may take three years in which to make final proof, but he must be living upon the land within six months after making his first filing and continue his residence during the balance of the three years. In this case it is necessary to reclaim and have crops growing on but one-eighth of the land.

The Carey Act limits the amount of land which can be taken by one person to 160 acres.

One who has already used any or all of his other rights—homestead, desert, timber, pre-emption, etc., is still permitted to take 160 acres under this act.

Under the Carey Act there is no provision excluding a person from its benefits who may own 320 acres of land. Under the other acts there is such a limitation.

The Company and the Government.

In 1903 and 1904 representatives of the government under the Reclamation Act made investigations in the North Platte Valley. They discovered that to reach the bench lands in Western Nebraska, the route already occupied by the Whalen Falls Canal was the only really feasible one to use, and after careful consideration an agreement was entered into between the United States and the company, which agreement in no wise affects either the legal status of the water rights nor curtails the benefits obtained under the Carey Act.

Pathfinder reservoir site. View looking west up the North River from the Pathfinder dam site, North Platte project, Nebraska.

The agreement is in brief, as follows:

The government acquired rights of way, the privilege of enlarging and extending the Whalen Falls Canal and for these rights and privileges agreed to carry the water appropriated by the Whalen Falls Canal in the new canal to the water users thereunder, and to make no charge for so carrying the water other than that of maintenance. It was stipulated that the cost of maintenance should be 40 cents per acre per annum until the canal was turned over to the water users themselves, after which the maintenance would be the actual cost only.

This agreement is most favorable to users under the Whalen Falls Canal; it gives them a low annual maintenance charge; it gives them a canal, head works, flumes, culverts and syphons as permanent as the best engineering skill can devise and unlimited financial resources can purchase. All structures are of concrete and steel, and an efficient corps is maintained for purpose of repair and administration.

This combination, existing nowhere else, has brought the United States Government practically into partnership with the canal company. The government's guarantee will remain with the work after completion. With 1500 or more cubic feet of stored water per second from the great Pathfinder reservoir flowing through the canal to water land in Nebraska the 286 feet belonging to the Whalen Falls Canal will be carried with a minimum loss from seepage and evaporation.

Irrigation Laws in Wyoming.

The irrigation law of Wyoming was framed with a view to rigidly protecting the buyer of water rights. Under its provisions the State Engineer is required to keep ratings of the flow of the rivers of the State, through the irrigation season, so that he may know just how much water each stream carries. If a man wishes to take out a canal he must apply to the State Engineer for a permit, stating how much water he intends to use, and what land he intends to use it on, giving dimensions of his canal. The State Engineer then computes the appropriations already made from the stream to see if there is any water left. If there is none, the permit is refused. If a permit is granted, the State Engineer computes how much land can be irrigated from the canal of that capacity, and a permit is given for the sale of water rights to so many acres and no more.

When the appropriation of water was made for the Whalen Falls Canal, only about two-fifths of the water in the North Platte River had been appropriated or claimed. This canal has, therefore, a clear right to use its full appropriation through the entire irrigating season. Its rights are prior to any use of water by the government.

By the recent Colorado-Kansas decision the rights of this company are strengthened because that decision recognizes the right of each State to control its own water, and recognizes the right of appropriation to a beneficial use. Be that as it may, no controversy can ever arise between this canal and any in Nebraska, for the reason that the supply is ample for all canals in both States which had used water at the time the permits were granted to the Whalen Falls Canal. The river supply will be greatly augmented by the return seepage from the government and other canals and the great government reservoir, by equalizing the flow in the stream will materially decrease the percentage of loss in the river.

Water Ready for Lands.

Water was first turned into the canal in 1904 and applied to a limited area. On account of the work of enlargement by the government, no water could be delivered in 1905 and during a part of 1906. Water was turned into the canal on May 1, 1907, since which time all desiring water have had an abundance. Probably one-half of all the land subject to the appropriation of the company is now being irrigated.

In the North Platte Valley, under the older canals, land is now selling for from $75 to $125 per acre and higher where peculiar conditions would naturally affect the price; such as close proximity to towns, unusually good improvements, etc. These prices justify a higher price for the lands under the canal, but the contract with the State fixes a maximum charge of $30 per acre. The contract with the State also makes it obligatory for the company to make this payment in ten annual installments with interest at 6 per cent and a maximum maintenance charge of 40 cents per acre per annum.

Easy to get Started.

In no other location will the new settler find it so easy to get under way. The land needs no clearing, no subduing; years of stirring, plowing and turning under of vegetable matter are not necessary to produce a condition of soil fit for garden or other high-priced crops. The sod is turned and harrowed, the warm, rich, mellow, loamy ground is then ready for any crop the settler may elect to plant.

Kind of Crops Raised.

In addition to alfalfa, of which three crops are grown annually, the following products are raised:

Lamb Feeding. Fortunes have been made by Colorado farmers in feeding lambs from Western ranges on alfalfa hay, topping them off with corn imported from Nebraska. The lamb feeding industry is destined to become one of great magnitude in the North Platte Valley. From its close proximity to the breeding range lambs can be trailed to the feeding lots, thus saving the freight into the valley. Rates on corn from Nebraska to points in the North Platte Valley being lower than on the same commodity to the lamb feeders in Northern Colorado, and with as favorable soil, climate, and more abundant water supply than that of Northern Colorado, there is no reason why lamb feeding in the North Platte Valley should not soon outrival the same industry in that State which enjoys a world-wide reputation for its fat lambs.

Potatoes. This soil is practically identical with that at Greeley, Colorado, where farmers have made fortunes out of potatoes. The freight rates to the potato markets of the East are better from points in the North Platte Valley than from Greeley. Railway facilities are also better.

Sugar Beets. Sugar beets raised in the North Platte Valley and shipped to factories in Nebraska, beat the world's record in the amount of sugar contained. The average yield for 1906 was seventeen tons per acre, while a yield of twenty tons or over was not uncommon.

Small Grain. Large crops of wheat, oats and barley are produced in the North Platte Valley. In the arid region, these crops are generally free from rust, smut, blights and insect pests. There is a good outlet for these crops and prices rule high.

Livestock and Dairying. For livestock and dairying no better location can be chosen than the lands under this canal. Hogs flourish on alfalfa, living in the fields in the summer and eating the hay with relish in winter, needing only a little grain to fatten them for market. Hog cholera is unknown. Horses raised in this climate and altitude have extraordinary wind, strength and endurance. Alfalfa produces a large flow of milk from dairy cows, and the cream is rich. Every farmer can keep up a small herd of cattle, ranging them on the lands above the canal in summer and bringing them into his straw stacks, stubble fields and hay stacks in winter.

Fruits and Vegetables. Every fruit and vegetable of the temperate zone may be grown in the North Platte Valley. Apples, plums, pears, strawberries, raspberries and other small fruits yield heavily and are of the finest qualities. Tomatoes, squash and other vegetables do well. Ordinary garden vegetables grow nowhere else as well and of so good quality as under irrigation. Groves of trees will soon reach good size in this soil, so that the settler may count on surrounding himself with every comfort of life within a few years.

Climate a Delightful One.

No more delightful climate to farm in, the year round, can be found than in the North Platte Valley. The altitude is about 4000 feet. At this elevation the summer nights are always cool, the air bracing and the sun's rays, in the clear air, are of great brilliancy. There is no sultry heat in summer, and such a thing as sunstroke is absolutely unknown. With weeks of unbroken clear weather, the farmer may cure his hay and harvest his crops without fear of damage.

The winter climate is mild, with open sunny weather, very little snow and no severe blizzards. The autumns are almost invariably without storms, and as the roads are good the year round, the farmer can always get his crops to market without difficulty or delay.

In the spring this region shares with Nebraska a rainy season. This spring rain is of incalculable benefit to the farmer. Coming early, it puts the ground into shape for plowing and causes the seed to sprout and grow quickly, thus avoiding the necessity for early irrigation—a fact that should be appreciated by every irrigation farmer.

Not a farm of the 20,000 acres offered for settlement is more than five miles from a station on the Burlington Railway. The railroad runs in the valley, and farmers in the uplands will have a downhill haul al the way with their produce. This valley has direct rail connection to Denver, Omaha, Kansas City and Chicago and enjoys lower freight rates than any other point in the irrigated region. In short, the railway outlets, now constructed and in operation, are complete to every principal market, north, south, east or west, from the Atlantic to the Pacific and from the Gulf to Chicago.

In the towns along the railways there are good stores, schools, churches, physicians and other essentials of comfortable living. In the open climate, the settler need provide no such shelter for himself or his stock, while he is starting as would be needed in an Eastern climate.

How to Reach the Valley.

From Denver, Omaha, Kansas City and other points east, take the Chicago, Burlington & Quincy Railway for Alliance, Nebraska, this line being commonly called the Black Hills or Pacific Coast line. From Alliance there is a daily train up the valley making good connections with these trains from the east and south.

There remains to be disposed of several thousand acres of choice land controlled by the company and subject to entry under the Carey Act. Parties desiring to view these lands should take the train as far as Wyncote, Wyoming. The main offices and headquarters of the North Platte Canal and Colonization Company are at Valley View Ranch, three miles from Wyncote. Parties on arriving at Wyncote should telephone Mr. Ed. H. Reid, the general manager of the company, who will provide conveyances and hotel accommodations during the time required for a thorough examination of the land.

Pumping for Irrigation.

The use of pumps and windmills for irrigating land is coming into very general use, and farmers adopting these methods are generally meeting with success. The amount of water pumped with a geared windmill, the lift being 12.85 feet, is given as 79.1 acre feet in a year. Gasoline is the fuel usually used where an engine is employed. A three horse-power gasoline engine will irrigate twenty acres, with an easy lift. Two sixteen-foot windmills will supply ten or fifteen acres with proper wind. Professor King has observed that a two and a half horse-power gas engine, with the same lift, in a six hours' run lifted 13,202.2 cubic feet, with a consumption of 458 cubic feet of gas at $1.25 per thousand, or at a rate of 95.4 cents for a day of ten hours. At this rate the engine could supply in one hundred days 50.67 acres with water at a cost for fuel of $95.40, or $1.88 per acre for the season, and $3.76 where 24 inches of water is supplied. With the same size of engine, using gasoline at nine cents a gallon and lifting the water against a head of 50 feet, with a double-acting pump discharging 75 gallons a minute, the cost for a 96-hour run was $4.95. In this time the water pumped was 432,000 gallons, at the rate of $1 for 214 cubic inches. In one hundred days of ten hours this plant would lift 601.605 cubic feet of water, or 13.81 acre feet, at a cost for fuel of $51.56, making the expense $3.73 for twelve inches of water per acre and $7.46 for 24 inches. Such a plant would easily irrigate ten acres 12 inches deep, or five acres 24 inches deep, without the aid of a reservoir. With a reservoir, 15 or 7.5 acres respectively could be watered.

Warning Against Frauds.

A warning against frauds on the part of persons who are trying to revive questionable irrigation schemes, since the government efforts have attained such wide prominence, is sounded by an official of the Reclamation Service. Shady promoters are making efforts to impose upon investors, especially through fake schemes in Arizona and New Mexico. Some of these are so deficient in merit as to have neither land nor water, but the mails are flooded with their literature. They find their victims in the East and South. To them they sell stock by promises of bewildering returns. In New Mexico, it is said, several companies are preparing to launch great schemes on streams, the waters of which were long ago appropriated and which are not sufficient for the needs of present canals.

This official warns intending investors to buy no water rights or lands without a personal inspection. There are plenty of splendid legitimate opportunities for homes in the West, he says, without persons being victimized by any fraudulent association of sharpers.

Sun is Put to Work.

The use of what is known as the solar motor is one of the unusual features that has grown from the pumping branch of irrigation. Should this invention develop into a success it will be a wonderful potentiality in those regions where water is close to the surface and there is almost continual sunshine, where rain does not fall in sufficient quantities to produce crops, but at the same time does not cause enough obscuration of the sun to prevent almost continuous pumping.

There is one of these solar motors now in operation in Arizona. It has been quite successful, but is still in the experimental period. Naturally it is a very simple device. Any boy who has taken a magnifying glass and burned a hole in a piece of wood by focusing and concentrating the sun's rays through it can understand the principle. The one in use in Arizona is but a mammoth concave mirror, which reflects the concentrated rays of the sun upon a boiler. It is furnishing water for ten acres of land.

The solar motor is naturally the cheapest power generator there is. Once set up, it costs nothing to run, for there is no charge for the sun's rays. There is, of course, the most sun where such a motor is needed the most and the greatest scarcity of fuel. The only difficulty is that in such places there is not likely to be great areas of water that are close to the surface. Along dry rivers and in depressions it can usually be developed, however.

Opportunity to Make Cement.

The great demand for cement on the irrigation projects seems to open a field for private enterprise in its manufacture. The mills of private concerns have been overtaxed and the demand is not being met. There are no manufacturers west of the Mississippi River that are ready to supply new orders, it is said. Material for making cement exists near several projects. A field of 350 acres of it has been found near Havre, Montana, convenient to the Assiniboine station. There is coal there for the burning of the rock and suitable clay. There are four irrigation projects in Montana, on which the government will expend $12,000,000, and a large part of this will go for cement.

Ground Water Investigation.

An investigation of the ground water resources of the Coastal plain of southern California has been made by the Geological Survey. The investigations have been carried on from Santa Monica to Aliso Creek on the coast, and inland from San Pasqual on the northwest through Santa Anita, Glendora, Pomona and San Bernardino to San Jacinto on the southeast. Engineer Walter C. Mendenhall has been in charge of this work. The reports show that throughout this whole area the people are dependent upon ground water, and a warning of the results in case of its improvident use is given. The supply is large, but concerted action toward the economical use of water is advised.

Nevada Project

Nevada Contains First Irrigation Project that is Opened

TRUCKEE-CARSON SYSTEM IS COVERING FORMER SEARED LANDS OF DESOLATE SINK WITH A GREEN THAT IS NOT MIRAGE AND NEW HOMES ARE SPREADING FAR ABOUT

NEVADA has the distinction not only of having been one of the principal centers of agitation for reclamation by the government and of having elected the legislator whose name is most closely connected with the Act of 1902, but of being the State where the first project under it was begun and the first one formally opened. The event, though not receiving the attention its importance deserved by the country at large, was one of note in Nevada and the West and of some celebration on the immediate scene. The opening which occurred in 1905, was marked by the presence of United States Senators and Congressmen and reclamation officials and the rejoicing of the farmers about Fallon. The opening took place June 17, the anniversary of the approval of the Reclamation Act.

Twenty-six foot fall and power house foundation on main canal of Truckee-Carson project. This power house when completed will develop 3000 H. P.

The Congressional party inspecting the newly completed headworks on the Carson River.

The Truckee-Carson system, one of the largest of all, has been supplying lands since the irrigation season of 1905. It can not be said, though, that the project was more than officially opened that year, for the water was being furnished to a limited area already under irrigation when the government began work. The first watering of government lands there took place during the Spring of last year. On February 5, 1906, water was turned into the main canals from Carson river. Only a small amount of water was delivered up to April. February and March were devoted to priming and testing canals.

No More Mirage, But Real Paradise On Desert.

Simple regulations concerning the use of water were promulgated at the same time and prepared for distribution by the ditch riders. They gave general notice that water was running in the canals and instructed farmers how to make request for it. Co-operation was asked of the settlers, especially that they do all in their power to repair breaks and otherwise prevent waste. After the opening of the canal system in February, the flow was increased gradually until the amount needed for distribution was attained. The maximum reached was 460 cubic feet per second in the main canal diverting from the south side of the Carson river.

Sheep feeding in winter time. This promises to become a great business in the future

A real paradise has taken the place of the mocking mirage.

The project lies in the bottom of a great valley which was once the bed of Lake Lahontan. On the mountains around there are beach lines, one of them five hundred feet above the floor of the present valley, showing that in days gone by there was sufficient rainfall upon the Sierra Nevada to fill this great basin and maintain a lake for a sufficient length of time to enable its waves to cut great breaches in solid rock. It is likely that this lake existed at the same time with the glaciers covering the northern part of the country. The same change in climate which wiped out the glaciers and left the great areas of fertile prairie land, must have lessened the rainfall on the Sierra Nevada and permitted Lake Lahontan to disappear by evaporation. All that is now left of this great lake are two lakes at the mouth of the Truckee River, known as Pyramid and Winnemucca lakes and a great shining mud flat at the mouth of the Carson and Humboldt rivers. When the lake had so far dried down that the Carson river flowed out over its bottom, the sands and sediments carried by this stream were spread over the clay beds left by the lake and as the river wandered from side to side across its delta, just as the Mississippi and the Nile have done, these old lake sediments were mixed with the sands and clays, forming the fertile soil which is now being farmed.

Record is Made in Bringing Water to the Land

Supervising Engineer L. H. Taylor, who had been for a number of years employed as resident hydrographer of the Geological Survey, and who in that capacity had been given an opportunity to study the possibilities of extension of irrigation in Nevada, had been for fourteen years prior to the passage of the Reclamation Act studying the possibilities of carrying water to the large area of fertile land in Carson Sink Valley by diversion from the Truckee and

Carson rivers. Mr. Taylor's plans were so well laid that soon after the Reclamation Act was passed surveys for final locations of canal lines were commenced. Fifteen months after the passage of the Reclamation Act actual construction was commenced. The prompt completion of the project with enduring works so far as to be able to carry water through the canals was unusual in the history of irrigation development in the West.

The Carson-Truckee project is in the Great Interior Basin, which takes in the whole of Nevada, nearly half of Utah, a strip on the eastern line of California and a large section of the Southern part of that State, parts of Idaho and Wyoming and the southeastern portion of Oregon. Its greatest length is 880 miles and its widest part, in the latitude of Salt Lake City, is about 572 miles across. At its broadest, the average elevation of the flat lands is about 3,000 feet. An elevation near its center and running from north to south divides the Basin into two sections that form depressions of equal depth, the Carson region on the west and the Salt Lake on the east. To the south there is an irregular depression, which is now the famous Imperial Valley, but was before the establishment of private irrigation works there known as the Salton Sea.

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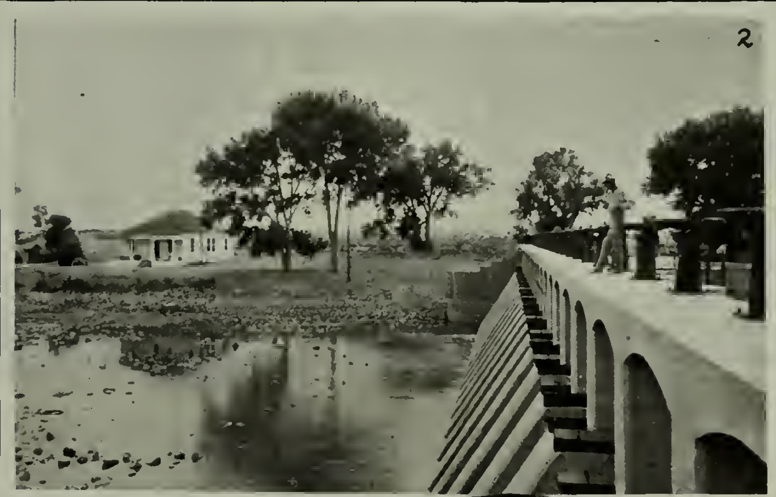

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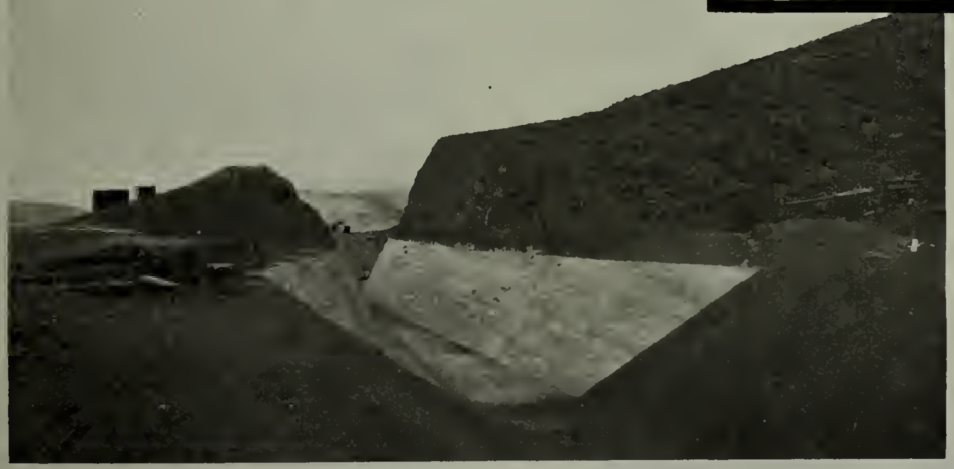

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1---Plat of sugar beets on experiment farm being run by the Department of Agriculture near Fallon. Sugar beets show a high sugar content and excellent yield in this climate. 2---Carson Dam. Dam built of concrete and steel for the diversion of water from the Carson River to canals of the Truckee-Carson project. 3---Earth canal, entering concrete canal, just above the waste gates, Truckee Canal. Truckee-Carson project, Nev., in Division 3. 4---Potatoes grown in new soil.

Famous Lake Tahoe Gives of its Waters.

It was a forbidding region, except for spots where water had been taken on land by private enterprise, this valley of the Carson Sink that is going through the chameleon change from ashy gray to green. There were rivers and lakes within or about it, though, in which the Reclamation Service saw the irrigation potentialities and its engineers camped there until they devised the plan of salvation for the ill appearing depression in thirsting Nevada. The two principal sources of water supply, the Truckee and the Carson, have their sources on the eastern slope of the Sierra in California.

The Carson and the Truckee have basins quite distinct, but there is a place near the town of Wadsworth where only a low ridge separates them and the water of one Basin is diverted with ease into the other. The water supply of the Truckee is much larger than that of the Carson, but the basin of the latter has a much larger area of land susceptible of irrigation and more easily reached than the land the Truckee drains. It was because of this that the first reclamation projected here was that of the Carson Sink Valley by the combined flows of the two rivers.

Famous Lake Tahoe figures in this project, too. Besides being a scenic wonder, it helps in this scheme of reclamation. The Truckee river, which rises at the southern end of the Upper Truckee Basin, at an elevation on the forest covered Sierra slope of from 5,000 to 11,000 feet —where deep snow furnishes a summer supply of water—plunges down into Tahoe at the south end of the lake and out again on the northwest side near the town of Tahoe, where the Truckee really takes on the importance of a river, capable of reclaiming farm areas. It flows northerly and northeasterly to Verdi, in Nevada, a distance of forty miles, and easterly forty-five miles through Reno Valley and Lower Truckee Canyon to Wadsworth. Here it turns sharply to the north, being narrowly cut off from juncture with the Carson, and is lost in Pyramid and Winnemucca lakes.

There are besides Lake Tahoe, several smaller lakes and basins that have been taken possession of for storage purposes and they will form an important feature of the project in its entirety. The natural reservoir sites supplied by the larger lake have formed an important factor in the merit of the big undertaking.

Main Features Embraced in the Project.

Two large reservoir sites have been selected along the main Carson. The upper one, Alkali Flat, is a large natural depression north of the river, between Dayton and Churchill. The other, known as the Lower Carson reservoir, is in the valley.

Briefly the main features of the irrigation system are a main diversion canal to carry the Truckee flow over the low divide into the Carson Basin and around the west side of the valley to Carson river at the dam site of the Lower Carson reservoir; main distributing canals for diverting water from Carson river below the reservoir to the principal bodies of land in Carson Sink Valley; the lateral distributing system to cover the lands; Lake Tahoe converted into a reservoir, with a capacity of 200,000 acre feet; reservoir at Alkali Flat with a capacity of 220,000 acre feet.

The Truckee canal carries 1200 second feet of water to the Lower Carson reservoir and about 200 second feet to a point convenient for a canal to the Pyramid Lake region. The canal is thirty-one miles long. The dam, headworks and tunnels are engineering works of some size. The dam is 155 feet long between abutments. There are fifteen piers to serve as posts for the sixteen regulating gates. The diversion point is five miles above the town of Derby. The elevation there is 4200 feet. The maximum discharge of the river is 10,000 or 12,000 second feet.

The construction of the Truckee canal in the canyon was a difficult and expensive piece of work. It represents also the greatest part of the expense. The formation in the canyon was so much broken, or open and porous that it was illy adapted to holding water. Concrete had to be used in lining this waterway. There are four tunnels on this canal, all in the second of the three divisions. They aggregate about 3000 feet in length. Loose sand was encountered in all the last 150 feet of the third one. It ran freely and the best that two shifts could make in it was one foot a day.

Besides the main headworks there are in this canyon the headworks of the Pyramid Lake canal and two very elaborate wasteways. These are massive structures of steel and concrete. There are six gates in the headworks.

The water rights under this project cost $26 an acre.

The western depression of the Great Basin, containing the Truckee-Carson project, should produce just as well when properly cultivated, as the Salt Lake part of the basin. The latter supports on an irrigated area of 348,125 acres a population of 197,959. An estimate of the population of the entire region that the Truckee-Carson project will eventually reclaim is nearly half a million persons. This is more than ten times the population given Nevada by the census of 1900. Of the 109,240 square miles in this state, only 3.7 per cent is covered by farms and but 0.8 per cent is improved. The percentage of cereals and vegetables that has made up the total of crops is very small, hay and forage contributing 71.6 per cent.

The Carson Sink Valley was crossed by the Overland trail, follwed by the gold seekers in 1849. There are to this day whitened skeletons or horses and cattle along its line, grim markings on this desert page of early day tragedy. The Reclamation Service in digging the broad waterways that are to make a garden of this place where the Argonauts died of thirst and fatigue, turned up at no great depth the bones of men that, dying by the wayside, had been interred by their companions. The grave diggers did not know that a supply of pure water lay only twenty feet beneath the surface of this desolate sink. In some instances they were only a few feet from this water.

RESOURCES OF CHURCHILL COUNTY

Everything There for Farming and General Investment

By W. C. BLACK

CHURCHILL County is analogous in some respects to the ideal conception of no less a personage than Abraham Lincoln, inasmuch as its diversified resources are closely knit together, and largely characteristic of the country, thus furnishing a concrete example of the doctrine propounded by the great emancipator, "In union there is strength."

In point of population Churchill County, until recently, stood at the bottom of Nevada's list. For thirty years a peaceful slumber characterized the county's existence, for, following the fall of silver in the markets of the world, its mineral possibilities seemed killed, while the agricultural lands were confined to the various tracts bordering the Carson River and its diverging streams, tracts limited in area. In view of these conditions it was little wonder that the census of 1900 showed but 6710 people of all ages, color and sex within the county's borders. Along about this time the matter of cutting Churchill's anatomy into choice morsels for annexation to adjoining counties was considered, but happily postponed until, with lusty, new growth it could be given an opportunity to demonstrate its claims to recognition as a section of potential resources.

Churchill County is larger in area than some States in the Union, having an extreme breadth from east to west of ninety miles, and an average width from north to south of sixty miles, comprising an approximate area of 5400 square miles. Included in this territory is by far the greater portion of the Truckee-Carson irrigation project, timbered and gazing lands, where many thousand sheep, cattle and horses find sustenance practically the year round; and wonderful mineral wealth, including nearly every metal known. In the valleys are found in addition to the wonderfully fertile agricultural lands, salt and soda deposits of great size.

Agriculture and Mining Bring Wealth.

The real future of Churchill County lies in the possibilities embraced by the agricultural and mining resources, in point of which the county must within a short time excel all other counties within the State. In the interim embraced by the decade, 1900 to 1910, Churchill County will have forged from bottom place in the State's list, to a point very near the top, if not the top. It is figured that the rural population of that part of the project embraced in the county, will within the next few years aggregate 50,000 souls. In substantiation of this estimate it can be said that the support for this population will come from the several thousand farm units, taken from the county's new lands.

Although water was first delivered to the land last year more than 200 families are actually living upon and improving their homestead selections and with the advent of another season, figures are adduced by the reclamation authorities to prove their claims that 500 families will be actively engaged in the work of home building. This means that 500 cottages will dot the ancient lakebed; it

Headgate of main canal, Carson-Truckee Project, with part of Carson River diversion showing in background Engineer L H. Taylor is standing on works. Mr. Taylor is now a Consulting Engineer.

means added wealth of almost incalcuable value; it means an actual demonstration of the success of the reclamation law, for without this law Fallon, the county's chief city, would still be a mere crossroads store; it means that products, for which millions of government money have been disbursed, would be worth only a fraction of what the producer has been receiving regularly for them during the past four years; in short it means an ideal section, where thrift and intelligence alone will gauge each man's earning capacity. Where irrigation prevails, agriculture knows three admirable conditions, certainty, abundance and quality.

There are still hundreds of unsettled tracts desirable in every way for the homeseeker. In addition to the public lands open to settlement, many of the old ranches of the valley are for sale in subdivisions for prices varying from $7 to $8 per acre to $100 or even more. In some parts of the county the farms average about 1200 acres in size and have been given over to grain growing and stock raising, many acres being unimproved pasture lands. In character of soil and general conditions this land, valued at from $7 to $50 per acre, is not essentially different from the lands which are in other less favored sections, used for fruit growing and which find ready sale at from $200 to $1000 per acre.

Cutting Up Large Tracts Pays.

A few good, live, honest real estate hustlers would find a wonderful field of endeavor in this section. They could get options on large tracts, lay them out in thirty or forty-acre lots, and sell them off. Cutting up the large farms will speedily follow the advent of the progressive homebuilder, who has used his homestead right. Mention of this is made that this class of energetic people may not stay away from a section so pregnant with resources. These people will find that forty acres here, properly tilled, will bring ample remuneration for effort.

There are many ranches of large size available for colonization. The largest ranch in the county is owned by State Senator R. L. Douglass and comprises in all 12,040 acres. Of the total 3000 acres carry a water right recognized by the government, and as the terms of the reclamation law prohibit the acquiring of water by any individual for more than 160 acres of land under this act, this and other ranches will be cut up into small tracts and sold, as the demand is made. Lands of this kind often need very little preparation and can be purchased for from $7 to $15 or $20 per acre; water can be purchased from the government for $22 an acre, payable in ten annual installments, added to which is the annual maintenance charge of 40 cents per acre.

The county's government is entrusted to F. M. Wightman, E. S. Harriman and F. A. Dalton, all old residents, the two latter gentlemen being natives of the county they now serve so well. With rare foresight they have foretold of Churchill's wonderful possibilities and as a county executive head they take the initiative in needed public improvements, in maintaining educational institutions and otherwise aiding in every way to aid development. Already the commissioners have superintended wisely the building of a county high school at a cost of nearly $20,000 and it is now being conducted by a small corps of teachers. It is the sincere desire of the County Commissioners who have for the time direct charge of this institution, that a general awakening shall ensue and that the importance of an educational campaign may be realized. In the near future the wisdom of their acts must be apparent to all.

Tax Rate is Very Low.

The rate of taxation is very low. For all county purposes, including State and county for the year 1907, it amounts to but $1.78 on each hundred dollars of the county's valuation, which is computed on about a 25 per cent basis of its real worth.

W. C. BLACK, Fallon, Nev.

The roads of the county are being constantly improved, the policy being to bring the mineral resources into closest touch with the agricultural resources of the irrigated section. Although the first gold producing mine was opened up two years ago, the mining population of the county has in that time multiplied, until today conservative estimates place it at 3000, thus furnishing an ever increasing market for local products. At least 100 big freighting outfits, dozens of stages and many automobiles now find their way over the desert sections intervening between Fallon, the county seat and railway terminal, and Fairview, Wonder, Hercules, Rawhide, Regent and dozens of lesser camps. The two first named camps have permanent populations of more than a thousand each, while Rawhide, the latest addition to the county's quota of promising camps, has half this number, and is growing at a rate that would indicate its taking a place among the State's great mining centers. Although but a few weeks old, it already has several restaurants, lodging houses, general merchandise stores, a bank, with many other new business enterprises contemplated. Of course there are saloons.

The camps of Fairview, Wonder, Hercules and Regent have already "made good" in the fullest sense of the term.

To do justice to any one of these camps would requires pages. It is enough to know that a single producing mine in the camp of Fairview has already produced wealth which allowed of the paying of $300,000 dividends after all expenses were met. Nearly fifty costly and powerful plants of mining machinery have been installed in the county. Nearly one thousand underground miners are now employed, and an investment of over $6,000,000 represents something of this wonderful development. The value and quantity of the mineral is only limited by the present inadequate method of hauling it from forty to seventy miles to Fallon for re-shipment to the ever-crowded smelters, which, like everything else, have limitations. In the not far distant future, a railroad will be constructed to tap the rich mining sections.

Reduction plants will be erected within the county for ore treatment. In fact one is already in course of construction at Hazen.

It is not a far cry from the wild sage of today, cumbering the ground with its ugliness, to prolific plenty, nor is it a far cry from the mountainous desolation to energetic development and untold wealth. Taken together, the two resources form a cohesive commonwealth, an empire in itself, and in the very nature of things the future of the section is assured. Nowhere else are the inducements offered that are to be found in this section, nor is there a place under the sun where individual effort is so abundantly rewarded.

Inquiry from prospective settlers, addressed to the County Commissioners' Board of Churchill County, Fallon, Nevada, will receive prompt attention through the clerk of the board, likewise Thomas H. Means, engineer in charge of the operation of the Truckee-Carson project, maintains a general intelligence bureau. The experts in this department will tell you something of the adaptability of the soil of the section to the various products that grow in a temperate zone. Mr. Means will furnish information relative to the laws under which you take this land, etc.

The county government and local business interests solicit correspondence from prospective settlers relative to local inducements.

FALLON IS THE CENTER

FALLON is the "Hub City" of the Truckee-Carson irrigation project and the chief source of supply of a dozen mining camps of importance. It is situated sixty miles south and east of Reno, the State's most important commercial center and the nearest town of any size. To the north, south and east magnificent distances intervene between competing trade centers.

Fallon is blessed with good water, and a climate that is one of its greatest assets. The mercury ranges from a few degrees above zero in winter to about 95 degrees Fahrenheit in summer. Seldom a day in winter and never a day in summer when the sun does not shine. With zero weather at night, the air is always warm with the advent of the morning sun, for with the absolute lack of humidity, the sun's rays soon dispel the chilly frost and at a winter midday in Fallon, absolute comfort can be had in your shirt sleeves.

The altitude of the town is 3950 feet. With one or two exceptions this is the lowest depression in Nevada's valleys. From every direction the entrance into Fallon is down grade, and it can be truly said that in times to come, it will be the center of adjustment for the largest and richest section in the entire State. To the south, north, east and west is potential wealth, including all the precious metals, salt, coal and oil.

More than half a century elapsed between the days of the "Nevada Immigrant Trail" and the building of a town in Churchill County. Although several score of the hardy pioneers paused in their march to the California gold fields and established homes in the Carson Sink, of which Fallon's site is the geographical center, a cross-roads store and temporary court house, around which was grouped a population of thirty or forty souls, forming the settlement known as Stillwater, sufficed for all county needs until the United States Government commenced work upon the stupendous irrigation undertaking.

The location of Fallon was a natural sequence. Following the commencement of project work in 1903, the men who had Fallon's making in their hands, started a settlement in the center of the project, as outlined by the government engineers. Other places made a bid for favor at the hands of the town builders, but the picturesque Carson River, the rows of mammoth cottonwood trees, which had grown from fence posts, strange as it may seem, and the centralized location of the Fallon farm, from which the town derives its name, could not be overcome by St. Clair, three miles to the south, although it had been a settlement and postoffice for forty years.

Becomes the County Seat.

So quickly did the county's residents recognize Fallon's future importance that within twelve months from the time of its founding the county seat was changed by legislative act from Stillwater, and a handsome courthouse was authorized.

The first store in Fallon was housed in the building now used as a stage office by the K. C. Stage Company and was owned and conducted by J. W. Richards, a time-honored pioneer, whose name is a household word in the homes of all old timers. It was here that the first calico and tobacco were dispensed, and in the early days of the town the local Piute tribesmen formed Mr. Richards' best customers, for at the time of his entrance into the local commercial field, white people in the neighborhood were confined to the farms near by, and not until the government commenced active work upon the construction of ditches was Fallon entitled to a place on the map.

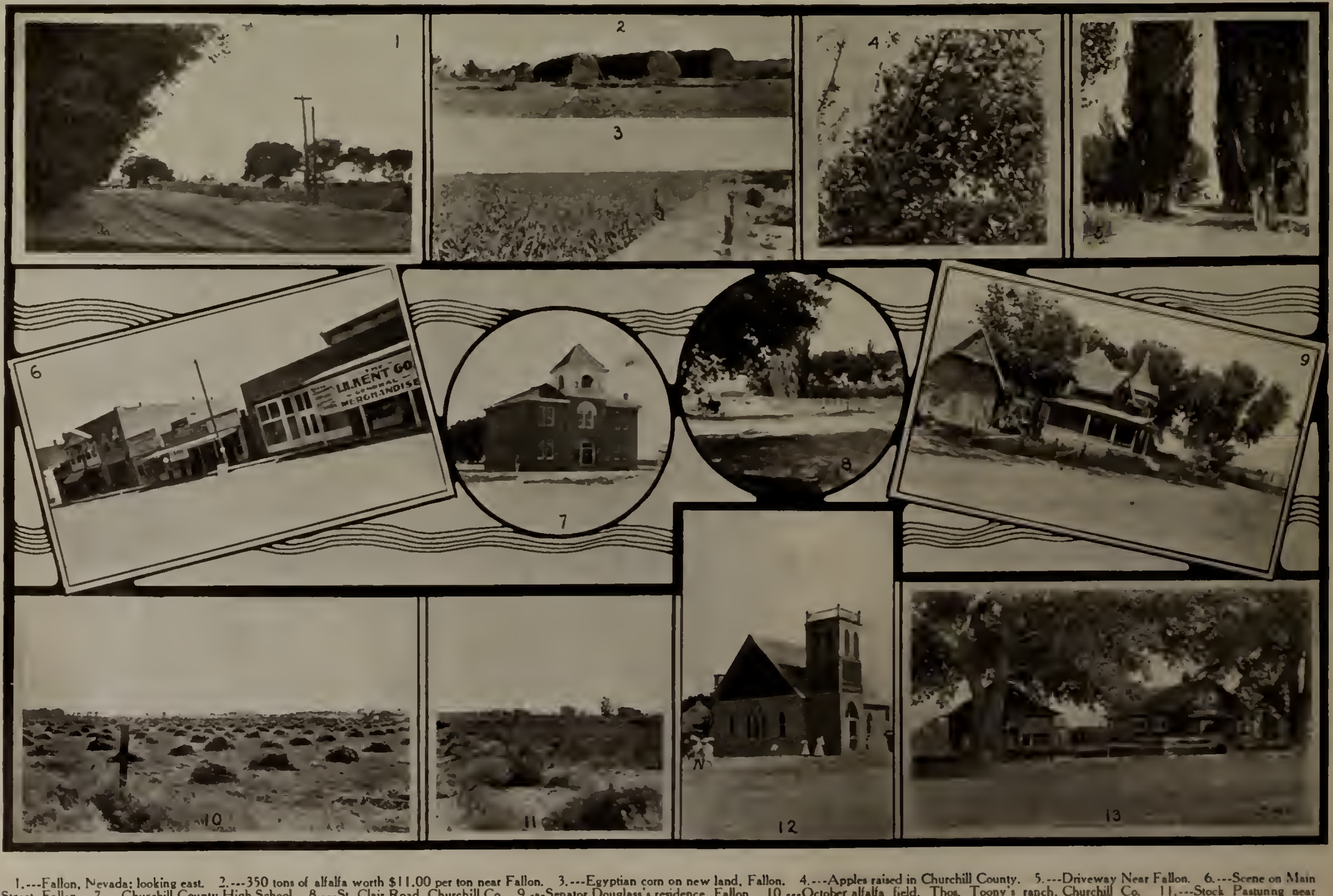
Two years after Mr. Richards had established himself in the future metropolis of Central Nevada, A. R. Jeffrey, a representative of the hardy old settler type, erected a hotel, which he named the New River. This building was purchased by W. W. Sanford in 1903. Under his direction it was enlarged and renovated and has since been conducted by Mr. Sanford under the original name.

A notable instance of the rapid rise in the value of Fallon real estate is furnished by the site of New River Hall, a pioneer structure. Originally a plot of land was included in the property, which was donated in 1902 out of public spirit by John Oats, upon whose ranch the town of Fallon is largely built. Within four years from the time the land was donated it was resold by the Hall Association at public auction for more than $100 a front foot.

In 1903 I. H. Kent, mentioned elsewhere in this sketch, moved his scant stock of general merchandise from Stillwater to Fallon and offered it for sale in a stone building, substantial, but of small size, which has since been added to until the I. H. Kent Company establishment is recognized as one of the State's strongest mercantile firms and occupies a building constructed of native stone and brick, with a frontage on Main street of 100 feet and has a depth of 100 feet. W. W. Williams later augmented the town's business personnel and established a general merchandise store that bears his name and transacts an ever-increasing business. The Williams store building is constructed entirely of native stone, and is one of the town's most substantial structures. S. Rosenberg & Company, the Thomas Woodliff Company and the Plummer Company are all general merchants of the later-day type. In all Fallon has five dry goods and general merchandise stores, one cash grocery, one exclusive hardware store, a sheet metal works, two meat shops, numerous saloons, four hotels, two lumber yards, several rooming houses, a planing mill, two newspapers, two wholesale liquor houses, one bottling works, four blacksmith shops, and two livery stables. Its most crying need is a steam laundry and a creamery, neither of which can be long delayed, as there is an ample field for them.

A Railroad Terminus.

The hundred cottages that have been erected, the $30,000 expended for public and high schools, the two new church buildings, the more than $100,000 that have been expended for business improvements during the present season only must be taken simply as indexes to the throbbing life



1.---Fallon, Nevada; looking east. 2.---350 tons of alfalfa worth $11.00 per ton near Fallon. 3.---Egyptian corn on new land, Fallon. 4.---Apples raised in Churchill County. 5.---Driveway Near Fallon. 6.---Scene on Main Street, Fallon. 7.---Churchill County High School. 8.---St. Clair Road, Churchill Co. 9.---Senator Douglass's residence, Fallon. 10.---October alfalfa field, Thos. Toony's ranch, Churchill Co. 11.---Stock Pasturing near St. Clair. 12.---Baptist Church, Fallon. 13.---Fallon residences.

of the little city in the heart of the great American desert.

In the spring of 1906 the Southern Pacific Company completed its branch line from Hazen into Fallon, a distance of sixteen miles, since which time the population of the town has doubled and its commercial importance increased four fold. A handsome depot was constructed by the company within the year following the completion of the railroad at a cost of approximately $10,000, and the monthly receipts of the various departments have grown constantly until today the Fallon railroad office is one of the most important in the State and handles, not only the enormous traffc emanating from the irrigation project, but the vast mining camp business of Wonder, Fairview and a dozen lesser camps.

Fallon has many advantages, not the least of which is the possession of capital sufficient to carry out any local enterprise of merit. It boasts of having two millionaires among its population, Hon. W. W. Williams, former State Senator from Churchill County, a stockraiser whose name has been a synonym of success and is closely identified with various business enterprises of State importance, and R. L. Douglass, present State Senator from Churchill County, who, as a young man of thirty, is the possessor of broad acres of land soon to feel the influences of Uncle Sam's water system, and who has resources, including stocks, bonds, real estate and mines that, taken as a whole are said to represent in the aggregate between one and two millions of dollars. I. H. Kent is roughly rated at half a million. The store whose management is centered in his hands does an annual business of about $500,000. It has been truly said of this local wizard of finance that he has builded three towns, Wonder, Fairview and Fallon. With rare business foresight he saw the opportunities before the unfolding, and acted as the middle man in the handling of the hardware, lumber and cement that entered into the construction of these towns.

Looks Like Optical Illusion.

God made Fallon's site. The Deity spread out the magnificent Carson Valley before it. An empire in itself, pregnant with resources, which when developed in full are capable of sustaining a population of 50,000 souls. He surrounded this region of diverse agricultural resources with mountains whose rough exteriors are forbidding in themselves, for they are poorly watered and sparsely timbered, but in these mountains are being found, even now, nature's treasure and as it is uncovered, the ore and bullion finds its way to Fallon for reshipment. The clanging bells of the Fallon-Hazen railway locomotives are symbols of progress, for they announce daily the arrival of two trainloads of homeseekers. The locomotives are even now pulling the mineral wealth to the outside smelters for treatment.

If the early day argonaut could see Fallon with its bustling population of 1000 souls, all actively engaged in the various processes that go to make up a business center, he would regard the sight as little short of an optical illusion, for here we have a settlement, working hand in hand with Uncle Sam, striving to transform the apparent contradiction of Nevada into harmony with the rest of the world.

A Prominent Young Man of Churchill.

What energy and intelligence, coupled with an honest purpose, will do for a young man in this country is exemplified in the career of J. E. Hicks of Fairview, this State.

The young man was born in Texas in 1877, and having removed to California at an early age, he became imbued with the patriotic spirit that permeated the youth of the State when the call for volunteers emanated from Washington at the outbreak of the Spanish-American war. Enlisting with Company K, First California Volunteers, he arrived in Manila Bay on the first transport that left San Francisco and helped Admiral Dewey take the Philippine Island city from the Spaniards. What he endured with his comrades as they lay for weeks in the pitiless rains between Cavite and Manila is a matter of history; how he fought with his company at Santa Ana and engaged in a brilliant charge has been graphically described by General Charles King, who himself personally led the charge until he was implored by the men of Company K to retire to the rear and not draw the almost concentrated fire of the insurgents to himself. The writer saw this action and he agrees with General King when the latter says that the American volunteer is the greatest soldier in the world.

In 1900, after having been mustered out of service, Mr. Hicks married Miss Kate Sutliff of Sacramento, Cal., and two interesting children have blessed this union. Later he became interested with the young millionaire State Senator from Churchill County, R. L. Douglass, and built the Fairview telephone and telegraph line, which, under his superintendency, has proven a great success. Mr. Hicks also has mining interests in the new camp of Rawhide, and the prospect of his becoming a very rich young man are bright indeed. That this will be the consummation of his efforts his hosts of friends will devoutly wish.

George W. Nixon Starts As Poor Boy and Rises to Proud Place in World

In all the history of the West there is no more striking instance of the triumph of brains and industry than the career of George W. Nixon, the present Republican representative of Nevada in the upper house of Congress.

He came to the State a poor boy from Canada and accepted a situation in the telegraph office at Winnemucca at a salary of $50 a month. He soon found favor with his employers by strict attention to business and the skill of his work.

He was gradually advanced in wages and finally accepted a position in the Winnemucca bank as cashier and soon became its president.

It was not long before Mr. Nixon became one of the heavy taxpayers of Humboldt County. He engaged in land speculations, mining and ranching and became known as a man of rare executive ability who could successfully handle many enterprises at once.

He finally became engaged in politics and represented Humboldt County in the State Legislature and then became a candidate for the United States Senate. He made a game fight for the office but refused to be bound by any pledges and was beaten.

Those who knew the indomitable character of the man, however, predicted that this first defeat would but spur him to fresh and more successful endeavor. Three years ago he again entered the contest for the place and was pitted against John Sparks, Governor of Nevada, and regarded in political circles as the most popular man in the entire State.

It was a hard fought and memorable battle and Nixon was triumphant. The struggle, however, was fought out on the most friendly lines and at the senatorial banquet given by the Senator-elect in Carson his defeated opponent was the guest of honor at his right hand and delivered one of the most glowing eulogies of the evening upon the life and character of his successful opponent.

During the last few years Senator Nixon has been engaged in mining and was among the first who invested money in the camps of Tonopah and Goldfield. As a financier he stands without a peer in the State and his word in New York or any part of the Union, in fact, is good for millions. He handles large deals and his shrewdness and financial ability and integrity are recognized everywhere, making his name a tower of strength wherever legitimate mining is carried on. In business he is quick to grasp the salient points of a proposition and when once he has sized up the situation he acts like a flash and his judgment is seldom at fault.

In the United States Senate he has been placed upon the most important committees because of his large grasp of public affairs and his well recognized business sagacity.

Harvesting Corn.

In the prairie States, where corn is widely grown, harvesting often continues until late in January, the common practice being to snap or husk the ears from the standing stalks. Five rows can be harvested at each "through," the wagon being driven astride the middle row, two men doing the husking or snapping. As soon as the crop is harvested, stock is allowed access to the field. In the spring the stalks are dragged down, raked into windrows and burned. This wasteful practice is quite general in the corn belt. Harvesting the ears is not harvesting the corn crop; it is merely harvesting about two-thirds of it.

To build a substantial shock that will stand up well is an art. A good plan where the common corn knife is used is to set up the fodder evenly around a skeleton or framework composed of the stalks growing in four hills, which form a forty-two inch square. Where the corn has been blown down and is crooked it is impossible to build satisfactory shocks. As soon as the fodder cures well, two men equipped with a strong rope about thirty feet long, with a metal ring in one end of it, and a ball of binding twine bind up the shocks tightly. One of the men places the rope round the shock and draws it taut while the other ties a piece of twine round it. Shocks of the usual size put up in this manner stand up well, and are only slightly damaged by the elements. Of course the corn binder can not be used in making shocks as described. When husked, the stalks should be put up in the same form of shock, unless they are to be hauled off the field immediately.

Sheep's wool will absorb a heavy weight of rain if the sheep are left out in storms. It is hard work for them to carry it around. It chills the blood into the bargain, and that is the worst thing imaginable for sheep.

If you plant eucalyptus trees 6x6 it will take twelve hundred to the acre and the acre will be five times the value it would be if not planted with trees, says an exchange.

LEMUEL ALLEN AND HIS CHURCHILL FARM

The man who has probably been the most important factor in the development of Churchill County, Nevada, is Hon. Lemuel Allen. It is not the purpose of this work to give a biographical sketch of any man, but the life of Mr. Allen is so closely identified with the history of Churchill County and the State of Nevada that any reference to the Sagebrush State, such as is incorporated in this work, would be incomplete, indeed, without reference to that gentleman and the work he has accomplished.

Mr. Allen was born in 1839. At the age of 23 he went to Nevada, forty-five years ago at the present writing, and settled in the then almost unknown district called the Carson Sink, where he built for himself and young wife his home. In this district he has lived ever since. By the hardest work he has acquired more than 1000 acres of land, the principal part of which is under cultivation.

While developing his farm land Mr. Allen studied law and was admitted to the bar by the Supreme Court of the State of Nevada in 1873. Being a staunch Democrat of the Andrew Jackson type, he soon attracted the attention of the leaders of his party. He first appeared in public life as the nominee on the regular Democratic ticket for the position of District Attorney of Churchill County. He was elected to that office in 1871 and re-elected in 1873 and again in 1880. Between these periods he served two terms as State Assemblyman and in 1902 was elected Lieutenant Governor of the State of Nevada. He is now the incumbent in the office of District Attorney, besides holding other positions of honor.

Mr. Allen is the president of the State Agricultural Fair Association and under his direction the recent State fair, held in Reno, fall of 1907, has been the most successful meeting ever held in that State.

Mr. Allen is a lover of fine bred stock and on his farm are to be seen some of the best bred animals in that part of the country. His ranch is considered the finest in the Basin, and when the duties of his office permit, he is to be found on his home place, directing and taking an active part in the constant improvements he is ever inaugurating.

Mr. Allen comes of a long-lived family, for at the age of 92 years his father is still living at the home place. There are few people, at least among the old timers, who at some period have not been materially benefited by the friendship of Lemuel Allen, and consequently he has gathered around him a host of friends who look with pleasure upon his success.

Mr. Allen has reared an interesting family, all of whom have started in life for themselves, leaving the old homestead, and in his declining years he finds the place too big and lonesome to continue living upon. Consequently he has decided to sell his property and retire from active life. The property consists of 1030 acres, all of which is reached by Government canals and laterals, with 480 acres enjoying perpetual water right, given by the Government in consideration of right of way for United States irrigation canals. On this 480 acres maintenance is the only cost. Four dwellings are on the ranch—the home place, a two-story cottage with four rooms on the main floor and two rooms above; one three-room cottage and kitchen, and two cottages of four rooms each.

A large barn 52x28 feet with stabling at both ends and one side capable of housing 20 head of stock, is also on the property.

Four hundred and eighty acres are under cultivation in grain, hay and alfalfa and 200 acres are in orchard, bearing apples, pears, plums and peaches. These fruit trees are the first ever planted in the valley. The rest of the land is used for pasturage, save 140 acres of timber land; the wood is worth $4 a cord in the tree.

The main branch of the Carson River flows through the property and water in abundance is found all over the place at an average depth of from seven to twelve feet. The soil is a sandy loam, with an average depth of six feet and rests on a body of quicksand. On this land anything can be grown save tropical fruits.

Mr. Allen will sell the ranch complete, guaranteeing perfect title, for the sum of $33,000, payable on easy terms.

The place is situated about seven miles from Fallon, Nevada, which offers a ready market for all products.

Fallon is a growing community of approximately 1000 people and is a terminus of the Southern Pacific Railroad.

All interested are invited to correspond with the owner, Lemuel Allen, Fallon, Nevada.

W. D. Kennedy's Success is one of the Romances of Nevada's New Advance

It is an old saying that truth is stranger than fiction and this is often true. It is also true that biography is oftentimes stranger and always more interesting than romance. Nothing could be more romantic or more interesting than the careers of many members of that great host that has won fortune in the mines of Nevada during the last decade. Taken together the stories of how these men amassed great wealth would make a volume that would rival the Arabian Nights.

One of the most interesting of these careers is that of W. D. Kennedy, the discoverer and father of Buckskin, one of the richest mining camps in the State. Kennedy was born at Vallejo, California. He learned the machinist trade, but was unfortunate and lost his hand in an accident. He then turned his attention to mining and in this was more fortunate. In fact, in the mining field he seems to have inherited, to a large degree, the golden touch of Midas.

He located the White Cross Mine, today one of California's great gold-producers, when only seventeen years of age. Later on he disposed of his interest in this property and gave up mining for farming. He came to Nevada and took charge of the ranch of W. C. Pitts, near Lovelocks. He remained there until 1902, when he was again attacked with the mining fever. He visited the southern mining camps, Tonopah, Goldfield and others. At Fish Lake Valley, with his usual good luck, he located a rich silver-lead property which is now owned by the Red Mountain Mining Company.

About this time Yerington was attracting the attention of mining men all over the country. Kennedy lost no time in going there, but upon his arrival found that the ground had been practically all located.

Mounting Buckskin, his favorite horse, Kennedy crossed Smith Valley to the range of low hill now known as the Buckskin range. He ate hi lunch in the shade of one of the iron-stained dike that crop prominently in these hills. Having satisfied the needs of the inner man, he began to tak notice of his surroundings. The formation of th dike looked promising to the practiced eye of the prospector. He knocked off a piece of the rock and upon panning it was rewarded by a string o gold extending almost around the pan. He a once made a large number of locations. His generosity is proven by the fact that he located two of his friends equally with himself.

The excitement attending the strike and the growth of Buckskin are familiar to almost everyone and need not be described here. Every new strike that is made and every advance in values of mining or town property adds substantially to Kennedy's fortunes. Though he has disposed of a part of his holdings and realized several hundred thousand dollars in cash, he still retains his interest in the Kennedy Consolidated and the Iron Mountain, two of the most valuable properties in the camp, so that what he still holds exceeds in values many times over what he has sold. A fortune like this, amassed in less than five years, is a wonderful record and one that would be possible in few places outside Nevada.

W. D. Kennedy on "Buckskin"

There is something in the free bracing air of this battle-born State that breeds generosity in her sons. Mention has already been made of Kennedy's generosity to his friends. His good fortune has not made him grasping or miserly. Everyone who knows Kennedy knows him to be generous, even to a fault. Wherever he goes he spends his money lavishly, has the best of everything that the land affords and is an all-'round good fellow.

Those who have only native grass pastures will do well to seed them with tame grasses. The wet season will give them a good start; it will also provide earlier and later green feed for your sheep, as well as more of it and of better quality in general.

Japan controls the camphor supply of the world. The gum is made from an evergreen shrub by a process of steaming the chips of wood and subliming the product. The Government of the United States operates two camphor farms in Texas.

Reno's Population Trebled During Last Three Years

RENO, Nevada's metropolis, has attracted the attention of thoughtful men and women the world over. Its growth has been so phenomenal that we have sent for facts about this picturesque and thriving city, and our correspondent sends the following, under date of November 10:

During the last four years the population of Reno has trebled. There are now 18,000 people here and this number is daily increasing. Reno is the banking, commercial, educational, social and railroad center of the State.

The total available funds of banks located in Reno amounts to $11,428,028 as compared with $4,137,782 in 1905. In a measure this will show the gain in importance of this city. There is probably not another city in the entire West that can make so good a showing.

Center Street, Reno, Nevada.

At Reno is located the State University. There are churches of all denominations and a fine Catholic university is now being erected. Three railroads center in Reno, giving to this city a large market, north, south and east of the city. In addition there are numerous branch lines feeding the main lines which open up a very large territory.

A few miles out of the city is located the government dam, which takes in the waters of the Truckee River for distribution through the irrigated district surrounding Fallon. The government engineers estimate that the land which can be supplied by this irrigation work will support a population greater than that of the entire State today, and all of this district will be tributary to Reno.

There are numerous industries located in the city doing a large and profitable business. The sales of the Nevada Packing Company are in excess of $2,000,000 per year. The Nevada Engineering Works has a large iron foundry, machine shops and boiler shops employing nearly one hundred men. At Sparks, two miles out of the city, are located the division shops of the Southern Pacific Company employing 600 men regularly and having a payroll in excess of $65,000 per month. Flour mills, brewery, wire works, mines, milling and reduction plants all combine to make Reno a great industrial center, while the inexhaustible supply of power that flows to waste down the Truckee River is a guarantee of cheap production.

At present local industries find it difficult to keep steady employees, owing to the lack of accommodation. The city is greatly in need of from four to five hundred additional houses. The restaurants are crowded at every meal. Boarding houses are filled to the limit of their capacity. In short the business interests have far outgrown the city.

During the six months from November to April the city is crowded by the number of mining men who make this their headquarters during the uncertain weather. At this time it is almost impossible to secure accommodation in the hotels and rooms are booked weeks and months in advance.

There is not a vacant store building in the city. Much new construction is going on in all directions, but the needs of the city grow faster than accommodations can be provided. Buildings contracted for and under construction in Reno at the present time call for an expenditure in excess of $700,000.

In the matter of stores Reno is not well equipped. There are not more than ten that could be called first-class and for some of these it is necessary to stretch the imagination. The trouble in this respect is solely due to the fact that every business man in Reno is doing business to the limit of his capital. Every store and every business is working to the limit. Extensions are taking place and within a very short while some remarkable changes will be shown in all parts of the city.

Reno offers greater opportunities and a better future than any other city in the West. The period of prosperity has really only just commenced and for the next five and six years the city will show a most surprising growth. Everything is on a sound basis. Its business houses enjoy the best of credit; its banks are amply provided with funds; its citizens are prosperous and enterprising, and they have a great and growing country population from which to draw more and more wealth.

In addition, the mining towns of Fairview, Wonder, Ramsey, Seven Troughs, Yerington, Regent, Mina, Tonopah and Goldfield are buying more and more largely in Reno and the wholesale houses are enjoying the greatest prosperity with every prospect of larger and larger increases with each succeeding month and year.

The climate is a particularly delightful one. Clear skies at all seasons of the year; in summer the heat tempered by the breezes from the Sierras and in winter the sheltering hills restrain the cold north winds so that rarely does the thermometer register a low degree. The average temperature for the year is 49.4 degrees. The warmest month, July, averages 67.5 degrees; coldest, January, 32.5 degrees. During the past five years there has only averaged 64 cloudy days per year. During the balance of the year 195 perfectly clear days has been the average each year.

Reno is the coming city of the West. It will prove to be of the same importance to the new State of Nevada as Denver is to Colorado and Salt Lake City to Utah. It is the city of oppor-

Truckee Bridge, Carnegie Library, and Park.

Virginia Street Bridge and Masonic Temple, Reno, Nev.

tunity and advancement; agriculture, mineral wealth, industries and development all tend to maintain the present growing prosperity, and the people of Reno, in inviting business men and homeseekers to come here, do so confident that no better opportunity exists in the West.

Nevada's Publicity Commission.

At the last session of the Nevada Legislature an act was passed to provide that State with an Industrial and Publicity Commission, such as exists in other States.

The appointment of the three leading Commissioners was left in the hands of Governor Sparks, who named Sam P. Davis, J. B. Menerdi, and Milton M. Detch.

Hon. Sam P. Davis, who had been eight years State Controller and Insurance Commissioner, was selected as chairman and he will continue to reside at the capital.

Captain J. B. Menerdi resides at Reno and is the President of the Commercial League of that city.

Milton M. Detch started the first Chamber of Commerce in Goldfield.

All of these gentlemen are of sterling personal integrity and known throughout the State as men devoted heart and soul to its interests.

They have taken hold of the work of advertising the State's resources and begun their labors by appointing associate commissioners in every county of the State, and these men have begun the collecting of data regarding the actual working mines of Nevada, classified by districts. Their aim is to give outside investors a series of mining bulletins which will present thoroughly reliable data regarding every mine in the State which is being actually developed, that they may thus be distinguished from the "wildcats" and the stock jobbing affairs which have been a curse to the State.

In the inauguration of a war on "wildcats" this commission has the active co-operation of every honorable citizen, and each county, under the law, appropriates money to carry on the work.

It is the intention of the commission to print and distribute for general circulation to banking houses, brokers' offices and financial centers throughout the East, these bulletins, which will be indorsed by the State officially and will enable all persons seeking for reliable information regarding mining properties in Nevada to secure exactly what they want.

This commission has the full confidence of the miners of Nevada, and the good which will result to the State can not be estimated in dollars and cents.

Sam Lusich Leaves Home of Luxury in Russia and Wins Fortune From Mines.

Nevada has witnessed the rise of many young men from poverty to wealth during the last few years, but it is safe to say the case of Sam Lusich has more romance attached to it than any other. Six or seven years ago Mr. Lusich, graduate from a college at St. Petersburg, surrounded by every comfort that wealth could buy, with uncles, aunts and nephews, as well as his mother and father, close to the Russian throne, decided that life under the rule of a Czar was less attractive than in a country where all men are equal. When the time came for him to enter the army, he quietly packed a few belongings and at the first opportunity started as an emigrant in the steerage of one of the big liners for the land of the free.

From New York to Nevada was not a difficult journey for him, even with his meager knowledge of the English language, learned during his school days. Three years ago fortune began rewarding the bright Russian, and now he is looked upon as one of the State's most successful young mining men.

Mr. Lusich's first venture was in the Jumbo mining district, south of Reno. He now owns some of the best mining property in that section. Then he went to the Yerington district, found unlocated ground close to the richest copper mine in that section and just a few days ago gave a bond on his holdings there which means wealth and ease for him during the balance of his days.

The same good luck followed him to the Rosebud mining district. There he owns what are conceded to be some of the richest prospects in Eastern Nevada. From there he went to Eureka County, and, with his same luck, located ground adjoining several claims which were later purchased by the Schwab interests. He is now negotiating a sale of this property.

In the Ramsey district Mr. Lusich also owns a group of claims, said to be as good as any in the district, and this means pay ore from the grass roots. Now he is going to the new Gold Circle district; that is, he is going just as soon as he can complete details for perfecting title to a section of ground from which some of the best coal yet found in Nevada has been taken.

North of Reno he also owns some excellent mining property, while surrounding the city he has controlling interests in more than a thousand acres of excellent oil land. Recently he organized an oil company and is about to begin sinking a well to reach the oil reservoirs believed to exist in this section.

With these extensive interests is it any wonder that this young man is becoming one of the leaders in the State?

Lusich takes his success as a matter of course, believing, as well he may, that success always comes to those who work for it. He believes in work and is always busy. When his affairs do not compel him to remain at his headquarters in Reno, he is in the hills, first in one district, then in another, always directing development and assessment work on his holdings.

Since coming to America Mr. Lusich has become a citizen of the United States and the country does not possess a more loyal subject.

"Only those who have lived in Russia or under the rule of any monarchy can appreciate the full value of the word liberty," said Lusich a few days ago. "The United States is the greatest country in the world today and I am proud to be an American citizen. I intend to spend my life here, build up my home in Reno and do all in my power to make Nevada one of the greatest States in the Union."

The Shirt-Sleeve Town.

I was nurtured in the country, where the barefoot boys are found,
And with each recurring summer I would fain be next the ground.
I can stand it in the city when the winter's grip is chill,
But in spring I want to wander o'er the meadow and the hill.
I can stand the clothes conventional when cold and snow are here,
But the coming of the summer makes me hate 'em all, I fear.
In the winter I can stand it where the tall skyscrapers frown,
But I want to spend the summer in a shirt-sleeve town.
Oh, you know the kind I'm thinking of, the kind where in the heat,
You can see the leading citizens out coatless on the street;
Where the banker and the preacher venture out before the throng
In a clean shirt and suspenders and go sauntering along.
Caring naught for others' scruples, fearing not their neighbors' scoff,
Cause the neighbors too, most likely have their coats and weskits off:
Where you wear whatever suits you, never dreading scowl or frown,
Let me spend my every summer in a shirt-sleeve town.

—Unidentified.

A fruit grower at Granger, Washington, secured seven thousand boxes of Winesaps and Jonathans which netted him $1.50 per box, making a net return for one acre of $1050.

DRIEST OF VALLEYS IS MADE FRUITFUL

DESCRIPTION OF CARSON SINK AREA, WHERE CANALS COVER THE LAND.

By H. W. Marean.

JUNE 17, 1902, was the birthday of the Reclamation Law. The people of America were aroused to unusual interest in the great work which the national government undertook at that time and have been following with continued interest the results of this great move in national industry. And now after a brief five years the first fruits of this "Irrigation Law" are beginning to be harvested.

Out in Western Nevada, in the Carson Sink Valley the United States Government has already spent nearly four millions of dollars in the construction of a great irrigation system—one of the greatest the world has ever seen. The system when finally completed will cost $9,000,000. It is already completed to deliver water to 100,000 acres of land, most of which is government land and a large portion of the latter is at this time (November 1, 1907) open to settlement under the homestead laws.

Location and General Description.

The Truckee-Carson Project is situated in the western part of Nevada in which is called the Carson Sink Valley. This valley is the bed of a prehistoric lake, long since dried up, and the materials which make up its soils are the deposits for the most part of the sediment brought into this lake by the mountain streams. The average elevation of the valley is about four thousand feet above sea level, about the same as the great Salt Lake basin, which it resembles in many respects. It is called a sink because the streams that empty into it have no natural outlet, and the water either sinks into the sands of the desert or is lost by evaporation. The valley is one of the driest portions of the United States, and consequently where irrigation has not been practised the surface of the ground presents to the eye a rather barren aspect. Small desert brush is now the only vegetation over the greater area of the valley. This is not true, however, of the margin of land along the river courses. Here a belt of timber breaks the monotony of the desert scene and presents a grateful shade to the wayfarer. It must have been these ribbons of pleasant verdure that tempted the first settlers in the valley to take the water from the rivers and lead it by ditches onto the thirsty soil. For, as much as fifty years ago, when the California gold hunters were rushing madly across this country, a few hardy spirits were at work preparing the way for a prosperity in the desert that would long outlive the riches of the gold fields. But these new-comers to the country had to depend for their irrigation upon a rather uncertain and limited water supply. It was not until the National Government undertook the vast work that is now nearing completion that a plentiful supply of water available the year round was assured to the farmer.

The valley, then, presents a circular basin of level or gently undulating land forty miles in diameter and encircled with lofty mountains. The Sierra Nevada to the west separates the State from California. The main line of the Southern Pacific Railway traverses the valley from east to west, but that portion of the land visible from the car window is for the most part counted worthless and not included within the irrigable lands of the project. To see the good country and to learn what it will produce, one must take the spur from Hazen to Fallon, the central town of the project and the county seat of Churchill County.

Towns.

Fallon, the county seat of Churchill County, is situated in the geographical center of the basin. It is a bustling little town of a thousand inhabitants, and is growing so fast that before this reaches those to whom it will be sent the town may have almost doubled in size. It is the terminus of the Fallon Railroad, a spur of the Southern Pacific sixteen miles long, which leaves the main line at Hazen. It is the gateway to the mines and as a supply town for the new rich mining district now being rapidly developed in Nevada, and as the center of the largest agricultural district in the State, it will reach ten thousand in a very few years.

Hazen is on the main line of the Southern Pacific, and is the next town in point of size to Fallon. It is the junction point also of the Tonopah and Goldfield branch and will undoubtedly develop into quite a railroad town.

Stillwater is in the eastern portion of the valley and at present is a small town with store, postoffice, hotel, school, etc. But this too will grow into a considerable town as there is a large body of rich irrigable land tributary to it.

Postoffices are located also at St. Clair and Hill and as the country settles up there will be more little towns springing up.

School and church facilities are good. There are numerous schools in the country districts and in the towns there are schools and churches. Fallon has a new high school building where sessions are now being held. A new brick grade school is in course of construction and will be ready for occupancy in a few weeks. In Fallon there are four or five denominations represented. The Baptists, Methodists, Episcopalians and Seventh Day Adventists have congregations here and the Roman Catholics are preparing to build.

Soils.

The soils of the Truckee-Carson project are various in character. They range from light sandy loam and loams to heavy clay lands along the river bottoms and near the margins of the lakes in the lower portions of the valley. All the soils are fertile though some are adapted to special lines of agriculture while others are fitted for all types of farming. Agriculture has been practised in the valley for fifty years and soils which have no fertilizer whatever applied to them in all that period are still producing large crops of alfalfa and grain. Analyses of these soils made in the government laboratories show the presence of abundant quantities of plant food. Alkali is not unknown in the valley. In fact this bug-bear of the irrigation farmer is a natural ingredient in all soils of the desert regions but its presence in the Carson Sink Valley is limited to certain localities and wherever it has been found by the government experts to be present in harmful quantities the lands affected have been withheld from the homesteader and such tracts are not considered part of the irrigable land. Furthermore, the government has constructed a complete system of drainage ditches throughout the entire valley and this wise provision will eliminate the danger of the accumulation of alkali where it does not already exist and will aid in the disposing of excess water and thus insure the success of irrigated farming.

The variety of soil is so great as to enable the settler to choose the lighter or the heavier soil, according to the line of agriculture which he intends to pursue, and furthermore it allows of a greater diversity of crop production than would otherwise be possible.

Climate.

The climate of the valley is very dry. This is one of the most arid sections of the United States. What little precipitation there is comes during the winter and spring months. Light falls of snow may occur during the winter but the ground is very seldom covered for more than a day or two and there is never snow enough to make sleighing possible. The average yearly precipitation is between three and four inches, an amount so small as to be practically negligible. During the summer the days are warm, with maximum temperatures some times as high as 105 degrees. In 1906 the highest was 101, and in 1907 the mercury at the government station near Fallon never rose above 99. And the dryness of the atmosphere makes this heat very much less oppressive than equal temperatures in the East, where the humidity is greater. The nights are always cool; a warm cover is needed practically every night of the year. In the winter the temperature falls at times to zero and has been recorded as low as 9 degrees below, but at this season, also, the extremes are not felt so severely as in other parts of the country. These minimums occur, of course, at night, and the days are almost universally warm and pleasant. In fact, the winter months are so mild as to make farm work, in the nature of clearing, plowing, leveling, etc., more agreeable than summer work.

The sun shines nearly every day in the year. Nearly 300 days are entirely cloudless. The valley is free from severe storms; cloudbursts sometimes occur in the mountains but these are not felt in the valley and do no harm to crops. The only storms that cause any annoyance are the windstorms, and these are harmful only because of blowing sand and dust. When the land is under cultivation, the soil, moistened by irrigation, and when trees have been planted through the valley, even this unpleasant feature of the climate will be largely eliminated.

Sudden changes of temperature are uncommon and the regularity of the climate is one of its best features. Untimely frosts are rare and it is very seldom that serious damage is done to fruit or young vegetables by late frosts in the spring. The last killing frosts do not occur after the 10th of May, and from the middle to the last of September occur the first light frosts of the fall. Alfalfa begins to show green the first of March and is harvested as late as the 25th of October.

Not only is the climate temperate and favorable to production of a wide variety of agricultural products, but it is very healthful. The dryness of the atmosphere is advantageous to those affected with pulmonary diseases, and on the other hand the elevation is not great enough to cause nervous trouble, which sometimes is characteristic of the high dry plateaus of the West.

Water Supply.

To a man unfamiliar with agriculture in the arid regions the importance of the water supply, its amount and manner of distribution can hardly be realized. Failure of crops through inadequate water supply, or financial failure through litigation over conflicting claims to the use of water, has robbed the irrigation farmer throughout Utah, California and other irrigation States of a large part of his legitimate profits. The Truckee-Carson farmer has Uncle Sam's guarantee of a complete and continuous water supply. Two rivers, the Truckee and Carson, contribute their united flow to supply the canals and ditches of this system. The Truckee River, which rises in the Sierra Nevadas, has for its principal source Lake Tahoe, in the lofty mountains where Nevada and California meet. By regulating the outflow of this lake a continuous supply is furnished throughout the season. Water is diverted from the river at a point about midway between Hazen and Reno and is carried by a canal thirty-one miles long around the foot-hills, irrigating a rich belt of bench land on its way, to empty finally into the Carson River. The Carson, which has its source also in the mountains to the west, sends down a less uniform flow, but by the construction of reservoirs the flood waters of the early spring are to be stored for use during the summer months. The water for the irrigation of the largest portion of the valley land is diverted from Carson River at a point about fifteen miles west of Fallon, and by a ramifying system of canals, laterals and small ditches, is carried to each individual homestead in the valley.

The government does not stop at the completion of the irrigation system, but continues to supervise the distribution of the water after the canals are dug and the dams built. Employees of the Reclamation Service are in charge of the delivery of water to each farmer in the valley, and the homesteader or the owner of private land notifies the ditch rider when he wants water and it is turned into his headgate. A generous allowance is made, so that each farmer is insured an adequate supply of whatever crops he may raise. The canals are constructed to carry enough water to give each acre three feet in depth during the growing season.

All the irrigation works are of a permanent character, being largely constructed of concrete or masonry. Thus the cost of maintaining this system will be, compared with other irrigation schemes, quite small.

Water for domestic purposes is generally found within twenty feet of the surface, although in certain localities wells must be sunk fifty or sixty feet at the present time to secure water. It is the plan to keep water in the ditches in localities where water is hard to secure, so that water for domestic purposes and for stock may be had during the winter months.

Agricultural Possibilities.

Until recent years agriculture in the valley has not been of the most extensive character. Alfalfa and grain have been the staple products, though many varieties of vegetables and fruit for home consumption have been grown. Until comparatively recently the closest railroad station was at Wadsworth, a distance of thirty miles from the irrigation lands of the valley. Furthermore, the fact that the Carson River as a rule goes dry in midsummer has made it impossible to raise any late-maturing crop prior to the construction of the Truckee Canal by the Reclamation Service. Consequently "farming" has been practically unknown. "Ranching" has been the practice. Stock men having herds of cattle and sheep in the neighboring hills have either owned alfalfa ranches along the streams, or have brought their herds here for winter feeding, but now that there is a new and different home market, the character of the products as well as the character of agriculture are undergoing a very radical change. The small farm is taking the place of the large ranch, and intensive methods are being substituted for the former extensive methods.

Alfalfa, however, is still the principal crop. It will yield from five to seven tons of hay per acre and is cut three times each season. Kaffir corn, Milo maize, Indian corn, millet and wheat grass or other forage crops have demonstrated their adaptability to conditions here. Grain does remarkably well, the Stillwater district being the principal grain belt of the valley. Wheat yields about thirty-five bushels, barley fifty bushels and oats seventy-five bushels per acre. Corn is still in the experimental stage, but the results obtained already indicate that it is well adapted to the conditions here and will yield from thirty to sixty bushels per acre. All of the hardy fruits do well. Apples, pears, plums, apricots, nectarines, cherries and all varieties of berries or vine fruit bear abundantly and produce regularly from season to season fruit of the highest class. It is thought by those who are acquainted with the best fruit districts of the West that this valley will one day rival the Grand Junction district of Colorado and the Yakima Valley of Washington. In these localities the raw land sells for from $250 to $350 per acre and as high as $1500 to $1800 per acre bearing fruit. Another line of agriculture which will soon become an important industry in the valley is sugar beet raising. Experiments have been carried on and tests made which point without doubt to the practicability of the beet sugar industry in this locality. High tests have been secured from beets grown here and a factory will be constructed in the Truckee-Carson district as soon as the agricultural population will warrant it.

Market gardening has already proven a very remunerative industry. The local conditions are exceptionally well adapted to potatoes and the splendid market for all vegetables makes this branch of agriculture highly profitable. Tomatoes, squash, cucumbers, melons and practically all vegetables do well and bring a high price in the local market. Nevada potatoes sell in the San Francisco market at a price so much higher than the home-grown product as to make it possible to ship from this State and still realize good profits.

Stock raising, especially the hog industry, promises to be a paying industry. There is a packing house at Reno, to which hogs are shipped from as far east as Nebraska and Kansas. Hogs can be produced as cheaply in this neighborhood as they can be east of the Rocky Mountains, and the difference in the freight rates represents just so much increase in profit from the business. Dairying, poultry and bee farming are other lines in which success is assured to those who conduct such enterprises in a businesslike fashion.

The United States Agricultural Department has established an experiment farm near Fallon and the work of investigation has already been begun here. It is proposed to test the adaptability of local conditions to various crops hitherto untried in our district, and to carry on various experiments for the pupose of finding out what is the best method of irrigation for the various classes of farming.

Markets.

The most hopeful feature of all is the market outlook, and this fact, of all, is the most important. Throughout the Middle West there are agricultural districts where immense crops are produced but because of the cost of transportation to the Eastern markets and the competition in production the profits are comparatively small. Here in Nevada, however, the agricultural area is exceedingly limited. Mining is at present the principal industry of the State, and because of the high cost of transportation from the outside, our locality has a great advantage over all other producers in the supplying of this home market. The mining market, furthermore, is the highest priced market known. The new camps of Fairview and Wonder lie just beyond the irrigated lands of the Carson Sink Valley and these new and growing camps consume a large proportion of the output of the valley. The older established districts of Goldfield and Tonopah are also within easy reach and it seems improbable that the time will come, at least within the next twenty-five or thirty years, when any produce of the Truckee-Carson district will need to be shipped outside of the valley to be marketed. The growth of the towns within the valley will constantly increase the demand. Furthermore, the new settler who must live from six months to a year in the community before he becomes a producer, must himself buy in the local market all the staple agricultural products. But if the local demands should be supplied we have California and the Orient close at hand. California is so largely given to the growing of fruit that the State imports large quantities of staple agricultural products. The Carson Sink Valley is as near to San Francisco as West Virginia, Ohio and Kentucky are to the Atlantic seaboard.

Securing a Home.

The question of paramount interest to the prospective settler is: "How can I secure a farm home on the Truckee-Carson project?" In general there are three ways. (1) By purchase of patented land from private owners; (2) by purchase from the railroad, and (3) by making homestead entry on public land under the terms of the Reclamation Act. A great many, no doubt, are surprised to learn that this grand opportunity to secure land free of all cost save a small fee, payable at the time of filing, is still to be had by homesteaders under this great irrigation system, but as a matter of fact, until recently no effort has been made to bring the grand opportunities of the Carson Sink Valley before the public at large, and many homeseekers have passed within a score of miles of this land in traveling to other districts where the opportunity was far less alluring, and consequently there is at present (November 1, 1907) a large body of land subject to homestead entry that lies under the completed government canal system. Although this land is being filed upon quite rapidly the area is so large that it is safe to say that one wishing to make homestead entry in this district will be able to secure a good eighty-acre farm if he comes to Fallon during the fall and winter of 1907 and 1908.

The public land has already been divided into farm units, varying in size from 40 to 160 acres; according to the location and the smoothness and quality of the land. The average size is eighty acres and the idea in the division of the land into farm units has been to give to each entryman approximately eighty acres of good irrigable land.

The forty-acre farms are those nearer town, or for some other reason particularly valuable, and these small farms have supplied the demands of those wishing to farm on a small scale. Those unfamiliar with the requirements of the Homestead Law and with the provisions of the Reclamation Act will wish a little more detailed information as to the requirements of the law regarding homestead entry. Any one wishing to make entry upon a farm unit in the Truckee-Carson district must first make a personal examination of the land, then he should go to the United States Commissioner at Fallon, or before the Land Office officials at Carson City, Nevada, and file his application. At the time of making such filing he is required to pay a filing fee of $6.50, $8.00 or $16.00, according as his entry includes 40 acres, 80 acres or 160 acres. If he makes filing before the United States Commissioner at Fallon there is an additional fee of $3 for making out the papers and administering the oath. This is the only first cost that is absolutely required. The water right costs $22 per acre, payable in ten equal, annual installments, without interest; that is to say, if you file upon a piece of land containing eighty acres, all of which can be irrigated from the government ditches, you will be required to pay $2.20 per acre each year for ten years for each and every acre of the eighty, regardless, of course, whether you actually irrigate the entire eighty-acre tract or not. In addition to this $2.20 per acre there is a small annual charge for maintaining and operating the system, which will vary according to the actual cost for the current year of running the irrigation system, paying ditch riders, repairing and cleaning the canals, etc., but the work of the government has been done so thoroughly that this annual charge which in many private irrigation companies amounts to a dollar an acre or more every year, will in this case be quite small, probably less than forty cents per acre on the average.

Then to sum up to the homesteader the land will cost in the first place his filing-fee, from $8 to $16, or slightly more, according to the circumstances. Next his yearly payment of $2.20 per acre, which is the price of the water right, and at the end of ten years must be paid in full. And finally there is an annual maintenance and operation charge of from 30 to 40 cents per acre.

The first payment for water is due in the first December after the entryman has received water in the spring of that year; that is to say, the entryman is given an opportunity to raise and market his first crop before he is required to make any payment for water.

For those who have not a homestead right, or who may wish, for some other reason, to purchase land from private individuals, the opportunity in the valley is excellent. There are nearly sixty thousand acres of land in private ownership, a large portion of which is already under irrigation and in crops. Such land can be had at from $25 to $60 an acre, including water right, the price varying according to improvements, location, etc. Such lands are for the most part in large ranches from 320 to several thousand acres in extent. There are, however, a number of smaller ranches, from 40 to 160 acres, that are on the market, but these, on account of the higher comparative value of their improvements, sell at a somewhat higher price. Patented land can be purchased in the unimproved state. There are several large tracts in private ownership which can be bought from individuals and for which water can be purchased from the government under the same terms as are offered to homesteaders. The railroad also has a large area for sale, and pactically all of this land has been subdivided into farm units similar to the government farm units, and to these farms the ditches and laterals have been dug for their irrigation. One wishing further information relative to the railroad lands should write to the land agent of the Central Pacific Railroad, Flood Building, San Francisco, California.

Some Capital Is Needed.

But though the land is free and the water can be bought from the government on the "easy payment system," without interest, still it is a mistake to think that one can secure a home here without some capital. A number have made this mistake, and settling upon a piece of land without stock or implements, or the means of purchasing these, have attempted to build up a home. A man with a family should have at least $1,000 in money or its equivalent, and he will do very much better if he has $2000. First he must build him a house, then he must buy horses, a plow, a harrow and a scraper beside a few other small incidentals in the line of farming implements. And he must make provision to feed both man and beast through one season at least, for it will take one year to get the raw desert land into a productive state and to make the land self-supporting. Lumber costs from $30 to $35 a thousand; a good team will cost $350—possibly more—hay is now worth $10 a ton in the stacks and grain values are in proportion. But it can be said truthfully that if a man with intelligence and industry will make a fair effort he can, even with this small capital, build up for himself a farm home in the Carson Sink Valley that will bring him plentiful returns and secure him a lifelong prosperity. A few instances will show how those who have already given it a fair trial have made marked successes. These, by the way, are the pioneers who have blazed the trail and made travel over the same road easier for those who come after. One homesteader who filed upon eighty acres of land received water for this land for the first time on the 10th of April, 1906. During 1906 he harvested twenty tons of hay, fed four horses all of the time and six horses part of the time. He kept a cow, sold one ton of hay and had hay until the 15th of July, 1907, at which time he cut his second year's crop. From his chickens he sold enough to pay his grocery bill and raised all the potatoes and other vegetables needed for family use. In 1907 he cut nearly seventy-five tons of alfalfa—thirty-two and one-half tons from thirteen acres on the first cutting, and alfalfa in this valley is generally cut three times. He will sell his entire first and second crop and have a large enough third crop to feed his own stock until next season. Besides this he raised enough grain this year to feed fifty chickens through the entire year.

And what this man has done any man with a reasonable amount of effort can do. He has in one year made his homestead self-supporting, although he has at the present time less than twenty of the eighty acres under cultivation, but from now on the road is an easy one, for, during the winter months, when he is not busy harvesting crops, he can use his stock and put more land in shape for cropping the following season, and every acre that he thus prepares for the seed means an asset of $1000 at a low estimate. His neighbor has about ten acres under cultivation. This homesteader cut three times this season and still has an abundance of green pasture which will last almost all winter. Many other instances might be cited to show how a large money return from a comparatively small acreage has been obtained by the new comer who is unable to farm extensively at the outset. Potatoes yield so heavily and such good returns are secured from raw land that it is possible for a man to put in four or five acres of potatoes and other vegetables and the first year clear enough to pay his water tax and have a bank balance to enable him to clear and level more land the following season.

Opportunities.

In the Carson Sink Valley the opportunities for the homeseeker or the investor are excellent. This applies not only to the agricultural lands but to the towns. Business openings in Fallon and the other towns of the project are most favorable. Fallon is a growing town and as the center of the agricultural district where intensified farming will be carried on and every acre made to produce a maximum return, and as the county seat of a large county that counts rich mining properties among its resources as well as fertile lands, this town should reach a maximum population of 10,000. For a young man either in professional or business life such a place offers a good location. To the investor the various business enterprises that can be entered into, as well as the land which is sold at a remarkably low figure, offer an attractive inducement. "Get in on the ground floor;" "Grow up with the country"—these are words of advice frequently given the ambitious young man who is seeking such a field for his endeavors.

Give the Trees Fertility.

Commissioner Pease of San Bernardino County apparently believes that the orange growers must wake up and give proper fertility to the soil. In a letter to the Cultivator he says:

"There is quite a difference of opinion in a certain locality in regard to the cause of dead wood in citrus trees. Some call it Florida die back and are spraying with Bordeaux mixture. Others who are considered good authority, think this is working on the wrong end of the tree and are using fertilizers as a remedy for the difficulty.

"For myself, I favor the latter theory, for I have found that the poorer and more porous the soil the greater the amount of dead wood."

The Colusa Sun says that many Northern Sacramento Valley fruits which have heretofore been shipped under Los Angeles labels will hereafter go forward under labels giving credit to the community where the fruit is produced.

The Harvesters.

The golden gleam of grain, bright in the sun,
And from the roadside comes the sound of leaves
That whisper in the hedge, the while the sheaves
Are marshaled where the noisy binders run.
Broad grows the stubble now, at day begun,
And in the hymn the harsh machin'ry weaves
There is no jarring note—no voice that grieves
Nor grudges the keen blades their vict'ry won;
For on the harvest field great nations win:
'Tis here they rise to power, or they fall;
No shock of war, no battle's awful din,
But on this peaceful field is settled all:
Here, through long, quiet hours, far from all strife,
Proud man comes humbly that he may have life!

—Unidentified.

Mason Valley, Rich Basin, and Yerington, Its City

SOMETHING ABOUT THIS GARDEN SPOT OF NEVADA, AN IDEAL PLACE FOR HOMESEEKERS, AND THE FAMOUS AGRICULTURAL AND COPPER MINING TOWN IN ITS CENTER

VALLEY SELLS PRODUCE AT HIGH PRICES TO SOUTHERN GOLD BEARING DISTRICTS.

ROOM FOR ONE OF THE LARGEST IRRIGATION PROJECTS AND LARGE POPULATION.

IN traveling through Nevada from east to west or from north to south the visitor or the prospective homeseeker sees very little of the agricultural section unless he gets off the line of the railroad and by team or auto explores the country lying more or less remote from the iron highway.

Mason Valley, lying in the central western part of the State of Nevada, is one of the largest and most fertile valleys in the entire state and embraces about 130,000 acres of the finest land that lies out doors. The valley is in the neighborhood of thirty miles in length and from two to ten miles in width and is watered for its entire length by the Walker River. At the upper end of the valley there are two branches of this stream—the East Fork and the West Fork—both of which find their source in the snow-capped Sierra Nevada Mountains in California. At the head of the valley these streams unite and the main river then flows on through the central and lower end of the valley until it finds an outlet in Walker Lake. The stream is one of the largest in the state, and near the headwaters of both branches there are exceptionally fine reservoir sites, which, if utilized by the government or private capital, could be made to store enough water to irrigate every acre of ground in the valley the year 'round and there would never be a shortage of water at any season of the year. The cost of constructing an irrigation system for this vast agricultural section would be less expensive than any of the great systems which the government has so far undertaken, and the beneficial results directly obtained would be much greater in proportion.

At the present time there are probably less than 30,000 acres of land under cultivation in Mason Valley, although the greater portion of the land is owned by individuals, and there are but a few thousand acres left in the hands of the government and the state.

Land, under cultivation, is held at figures ranging from $20 to $75 per acre, according to quality, its proximity to market, title of owner's water right and state of improvement. The soil is mostly a sandy loam, but in some sections is mixed with a light adobe. In all cases it is strong and deep, producing from four to seven tons of alfalfa to the acre, ten to fourteen tons of potatoes, seven to ten tons of onions, forty to eighty bushels of barley—and in some cases 100 bushels—thirty-five to fifty bushels of wheat, and "garden truck" in such abundance as would make the New England and Middle-West farmer open his eyes in wonder.

Beet Sugar Factory Is Needed.

And all of this produce is of a superior quality; the alfalfa is not of a rank and woody growth but is fine and nutritious; the wheat makes flour equal, if not superior, to any in the world; the barley is full and plump, while the potatoes are noted for their size, firmness and flavor, and have the reputation of being the finest produced on the Pacific Coast. In seasons when the late spring frosts do not damage the fruit blossoms, the apples, Bartlett pears, peaches, plums and small fruits are the most delicious produced in any state in the union. Hops thrive wonderfully well in Mason Valley and the sugar beet finds the soil most congenial. As to the latter, it has been demonstrated that from fifteen to thirty bushels of the tubers can be raised on an acre of ground and that the saccharine matter contained in the beet ranges from 16 to 23 per cent. Capital could create a great industry in this district by the establishment of a beet-sugar factory.

REGION IS WATERED ITS ENTIRE LENGTH BY SNOW-FED WALKER RIVER.

MOUNTAINS SURROUNDING IT SHOW MINERAL PROSPECTS THAT MEAN MILLIONS.

High Prices for the Produce.

The climate in Mason Valley is superb. The altitude is about 4400 feet and the atmosphere is clear and pure. In the summer the thermometer rarely reaches the 100 degree mark, and no matter how warm the days are, the nights are cool and refreshing. During the winter months the thermometer seldom drops below zero, and it is a rare thing to see three inches of snow cover the ground in the valley for a period longer than a few days. The days are crisp and sunshiny the year 'round and damp, foggy, gloomy days are few and far between. The entire animal family thrives well in the district with less care and attention than in any other country known, and all stock grows fat on alfalfa hay.

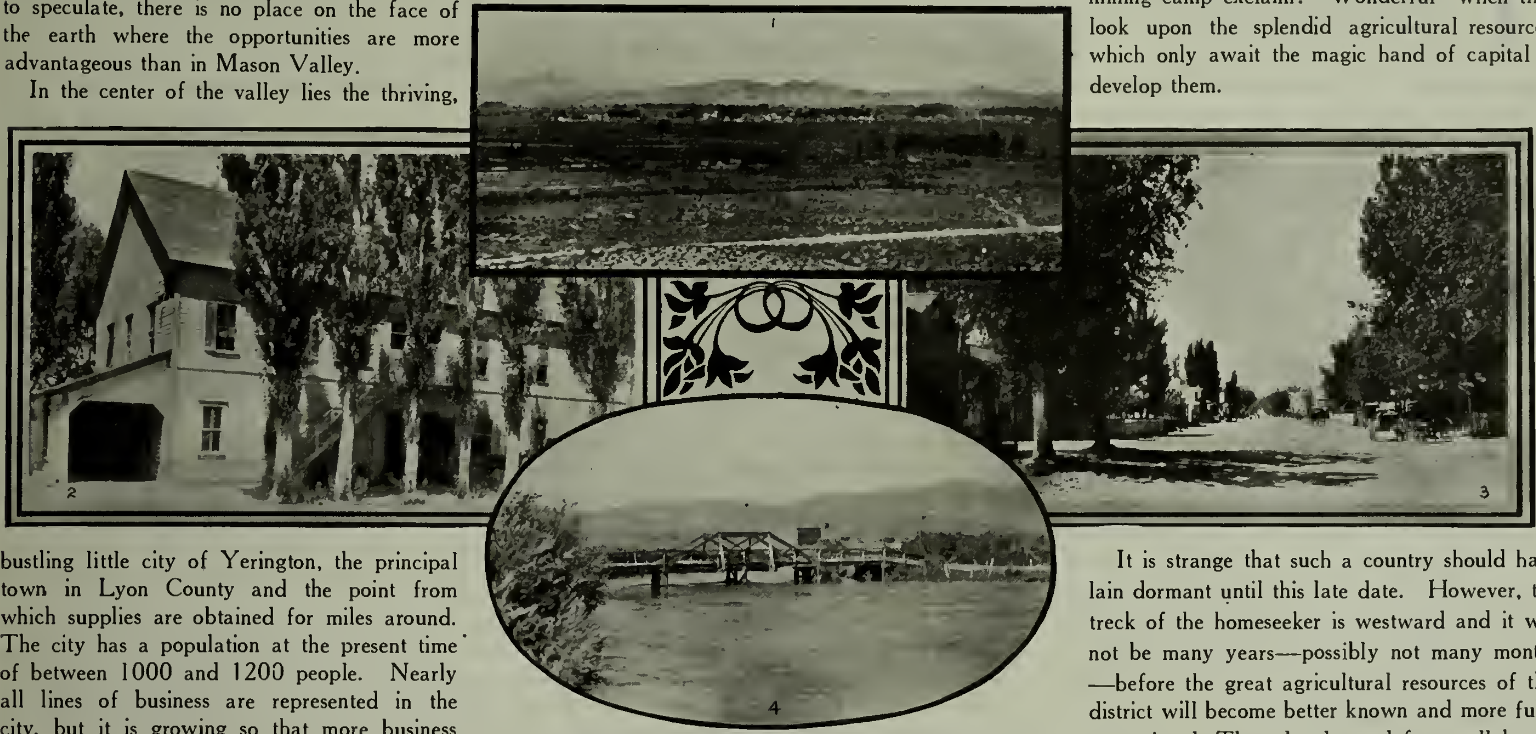
In the way of manufactories Mason Valley has two creameries and one flouring mill, which furnish butter, milk and flour for the people of this section, besides a great quantity which is shipped to the mining camps of Tonopah and Goldfield in the southern part of the state, where the product commands the top market prices on account of its superior quality.

The price of land in Mason Valley has nearly

1.---Douglas Copper Mine near Yerington. 2.---Farm Scene, Mason Valley near Yerington. 3.---Stacking alfalfa, Mason Valley near Yerington.

doubled in value in the last six or seven years because of the demand of the southern mining camps for the superior agricultural products grown there. The price of alfalfa hay is now about $10 per ton in the stock; the average price of potatoes is from $16 to $20 per ton; wheat $30 per ton; barley $28 to $35 per ton and other produce in proportion.

To the homeseeker, or the man with means to speculate, there is no place on the face of the earth where the opportunities are more advantageous than in Mason Valley.


1.—General view of Yerington and Mason Valley. 2.---Yerington Creamery. 3.---Main Street, Yerington. 4.---Walker River, enough water to irrigate millions of acres.

In the center of the valley lies the thriving, bustling little city of Yerington, the principal town in Lyon County and the point from which supplies are obtained for miles around. The city has a population at the present time of between 1000 and 1200 people. Nearly all lines of business are represented in the city, but it is growing so that more business houses of every character will be necessary.

Yerington in Copper District.

Yerington is reached by leaving the main line of the Southern Pacific Railroad at Hazen and traveling by rail south forty-two miles to Wabuska, at which point stage and auto lines from Yerington meet all trains and convey passengers twelve miles to the city.

Mason Valley and Yerington are fortunately situated so far as a market for produce is concerned and regarding a supply point, as nearly every other section of the world now knows something of the great Yerington Copper District—the district in which development work during the last eighteen months has shown up some of the greatest copper prospects in the world, and which future development work will undoubtedly demonstrate to be the greatest copper camp in the world.

And these mines lie in the mountain ranges that skirt the eastern and western edges of Mason Valley.

Some twenty-five miles to the south lie the Pine Grove and East Walker districts, while on the east the great Walker Lake Reservation district stretches from north to south for a distance of fifty miles. In all three of these districts some very fine gold prospects are being developed and some properties are being worked profitably.

All of this great mineral section is directly tributary to Mason Valley and Yerington. It is not strange then that mining men who drift into Mason Valley from the East, North, South, Europe and Africa, with the expectation of seeing an ordinary mining camp exclaim: "Wonderful" when they look upon the splendid agricultural resources, which only await the magic hand of capital to develop them.

It is strange that such a country should have lain dormant until this late date. However, the treck of the homeseeker is westward and it will not be many years—possibly not many months—before the great agricultural resources of this district will become better known and more fully appreciated. Then the demand for small homes in this God-favored valley will be so great that the large holdings will be cut up into small farms for the settler with moderate means. Railroad facilities, which are promised the district in the very near future, will open the way for the people of the overcrowded Eastern and Middle-Western States to visit the great Mason Valley country and judge for themselves of its wonderful agricultural resources.

For information in regard to the ***Lands, Mines,*** etc., in the vicinity of ***Yerington*** and ***Mason Valley,*** write to Secretary Chamber of Commerce,

YERINGTON, NEVADA.

Richard Phelan's Nevada-California Electric Power Project

NATURAL CONDITIONS MAKE IT POSSIBLE TO GENERATE GREAT FORCE THAT CAN BE SUPPLIED TO RENO AND OTHER CITIES AND GIVE PROFIT OF 240 PER CENT ON INVESTMENT.

TO furnish Reno and many other of the leading cities of Nevada, as well as Marysville and the Northern Sacramento Valley, in California, with electric power at about half the rate now paid and at a profit of about 240 per cent is what Richard Phelan, known in both States, promises to do. Capitalists of Reno and other places are displaying much interest in the proposition, especially as Mr. Phelan has virtually shown them that he can do all he says he can.

Mr. Phelan is one of the best known and most highly respected mining men in the West, and the fact that he does not take up anything that is not practicable and feasible gives standing to this project, though the results claimed are far beyond those usually obtained. The great profit from this enterprise is made possible by the simplicity with which the power may be developed.

Mr. Phelan, who is a capitalist himself, is general manager of the Sierra Mercantile Mining and Power Company, the secretary of which is R. W. Gillogley of the law firm of Kierce & Gillogley of San Francisco. It is this company, which also owns about forty producing gold mines, that is putting the power projects through. Mr. Phelan is its principal stockholder.

Near Sierra City, just across the California border, Phelan owns six lakes. These are Gold Lake, the four Bear Lakes and Eagle Lake. He also owns the water rights on the upper streams of the Feather and North Yuba Rivers. From these lakes and rivers, under the rights that he owns, can be generated 37,000 horsepower, according to the most conservative estimates of engineers. To this Phelan intends to add by purchase about 7000 horsepower now held by a man named Lague.

From the site of the power plants on the lakes and rivers it is but 42½ miles to Reno, not a great distance to carry electricity. Phelan says that he can install the system for only $50,000 and have it ready for operation inside of eighteen months. The company has commenced work already and he says he will bring the electricity into Reno without any unnecessary delay. By furnishing the electricity at $5 per horsepower, Phelan says he can assure an income of 240 per cent on the amount of money it will be necessary to invest.

The lakes mentioned will supply about 20,000 of the total horsepower it is expected to develop and the remainder will come from the energy of the Yuba and Feather Rivers. Grading for a power house at Denton, on the line of the Western Pacific, is going on now and within the next six months electricity from it will be furnished to the people of Sierra City and Downieville and to other subscribers.

A drop of 2000 feet in six miles from the foot of Gold Lake is shown by the maps of the United States Geological Survey. The amount of power that can be generated is sufficient to supply Reno and run many of the mines and industries in the surrounding country. Phelan says that there is nowhere else a natural site and natural conditions for the generating of power at trifling cost that equal those in the district where his company is operating.

To verify his statements Phelan has many photographs, charts, United States geological and topographical maps and Punnett's map of Sierra County. "If there should be any one that is skeptical," he says, "let him come with me and I will show him some of the most wonderful country on the map. Besides some of the finest scenery in the Sierra I will show him every feature of this wonderful power proposition, and he will come back convinced that all I say is true—that not one thing is misrepresented. Whoever goes will be surprised at what he sees. There is a natural power proposition embraced in this district that will arouse the admiration and enthusiasm of any one."

The Mercantile Mining and Power Company has broken ground at Gold Lake for a ten-foot dam that may be raised if necessary. A similar dam is to be constructed at Long Lake in Plumas County and the pipe laid down Gray Eagle Creek. It and a similar pipe that is being laid down Frazier Creek from Gold Lake will converge at the power plant, where all the waters are to be combined and utilized. The force attained will be a tremendous one. There is no doubt, Phelan says, that all the power claimed and most likely more can be generated.

Thorough data on the precipitation of rain and snow and the area of drainage that feeds the lakes has been prepared by two engineers that have been engaged on the work for eighteen months. This data shows a supply of water that is more than adequate for all purposes of the power scheme. There is a tremendous precipitation of rain and snow in this part of the Sierra.

A railroad from Marysville to Reno will be one of the enterprises for which the power will be used. This road will run through Yuba Pass, which is the route that it is supposed the Rock Island Railroad will take when it constructs the line to the Pacific Ocean that has long been under contemplation. The decision in the Oakland water front case, wherein it was decided that the Southern Pacific had no right to much of that frontage claimed by it has given fresh impetus to the Rock Island plan to reach San Francisco Bay. The electric road projected by the Phelan company will pass through Downieville.

Of the forty mines that are owned by Phelan and the company in which he is the main figure some are putting out free milling ore of high grade variety each week. Shareholders in the power project are also shareholders in these mines.

Besides Reno, power will be taken to such towns as Rhyolite, Bullfrog and Tonopah. There will be enough to supply a number of places.

The lakes and the region surrounding them hold much for the fishermen and the hunter. There are plenty of trout and game. Mr. Phelan will establish a summer resort at the lakes next year. There will be fine boating and bathing and the health and scenic features will be perfect.

Governor John Sparks, Beloved and Honored by the People of His State.

It is not the purpose of this sketch to give any dry and colorless autobiography of the man who all over the West is known as "Honest John Sparks," but to dwell upon his achievements and character.

He was born in the State of Mississippi sixty-two years ago and when quite a young man migrated to Texas, where he engaged in the cattle business, and came to Nevada in 1870.

He purchased land in Washoe County and founded the Alamo Ranch, which has since become one of the most famous stock farms of the West, by reason of the long array of prize winning Hereford cattle which have mowed down competition on many a memorable field where it took blood and pedigree to carry off the pennant of victory.

John Sparks had an ambition to have the finest band of Hereford thoroughbreds in the United States and he began to lay the foundation when he commissioned an agent in England to buy, regardless of price, the choicest prize-winning cattle that could be found there.

When Mr. Sparks took the first prize at the World's Fair at Chicago, with his incomparable Duke of Shadeland, the cattle breeders of the United States woke up to the fact that Nevada was on the map as a producer of thoroughbreds.

At this same Alamo Ranch, about three miles from Reno, can be found thoroughbred horses, elk, deer and buffalo browsing side by side on the velvet meadow lands and clover fields of the Alamo.

There is something else that greets the visitor and that is the most genuine brand of southern hospitality to be found anywhere in the West. The big, open rooms, the blazing fire-places, the air of warmth and welcome and the graceful way that Mrs. Sparks, beloved by everybody in the State, makes the visitor feel at home, have gradually become proverbial in Nevada.

Mrs. Sparks is as thoroughly democratic in her disposition as her famous husband. A single anecdote will suffice to illustrate her capacity to dispose of every situation that arises. Some years ago, just after her husband's inauguration, she was attending a miners' ball given by the employees of Mr. Sparks' mine at Widican. The miners were having a jolly time dancing on the rough floor of the dining hall to the music of a single fiddle when Mrs. Sparks and her party entered. She wore the same dress that had graced the recent inaugural ball at Carson and none of the miners had the nerve to invite her or any of the richly dressed ladies in the party to waltz. Presently Mrs. Sparks walked up to a group of the men and said: "Gentlemen, I didn't come here to be a wallflower. If there is a miner in this place who hasn't danced with me and these ladies of my party by the time this ball closes, he will be thrown off the payroll of this mine and I will see that my husband attends to it."

A roar of laughter greeted this speech and the ice was broken. By three in the morning the train of Mrs. Sparks' inaugural ball dress was a thing of shreds and patches and the other toilets were in the same condition, but the ladies all agreed that they "had had the time of their lives."

When John Sparks was called upon to head the State fusion ticket six years ago, the nomination was not of his seeking. There was a universal demand that he should be the standard bearer of the party, and he said if there was a single man in the convention who opposed his nomination he would not accept. His name swept the convention at Reno off its feet and he was nominated by acclamation.

His opponent, A. C. Cleavland of White Pine, was a life-long friend of his and a cleaner campaign was never made in Nevada. Each man bet a thoroughbred bull on the other's election. Sparks sent his defeated opponent the finest yearling in his herd and the long friendship remained unbroken.

Two years later ill-advised friends induced Sparks to run for the United States Senate. His very strength with the masses of the people proved his undoing. The laboring men of the State knew that they could depend on John Sparks while he was in the Governor's chair, but they did not have the same feeling of confidence in his successor, should he be selected to go to the United States Senate. With this idea in their minds, hundreds of Sparks best friends voted the Republican legislative ticket. When the Legislature met, it was Republican on joint ballot by three majority, and Sparks sent a good natured congratulatory dispatch to his successful opponent, George Nixon. The result, however, did not satisfy some of Sparks' friends in Salt Lake. They raised a large purse and sent an emissary to Carson to swing the sack in the Governor's behalf. The man, who found one of Sparks' managers, unfolded his plan of winning the fight with money, and was informed that Sparks would never allow such a thing. He was incredulous, and Sparks was found. When the plan of campaign was unfolded Sparks replied:

"Mr. Nixon has won his fight by the election of a Republican Legislature. He has won it fairly. Had the Legislature been Democratic and he bought votes which belonged to me, I would regard him as a scoundrel, and should I buy votes belonging to him or allow them to be bought I would be justly regarded by him and the whole State as a scoundrel. If a five-cent piece is spent for my election, I shall decline to accept the office if elected. I am still Governor of this State and am sworn to obey its laws."

This speech was characteristic of the man and his principles. Two years later he announced his retirement from politics, and when the State convention met, Sam P. Davis, then State Controller, and James P. Sweeney, then Attorney General, were both gubernatorial candidates. At that time labor troubles of a serious character threatened the State and there was still a clamor for Sparks coming up from all quarters of the State, for Sparks alone was regarded as the one man who had the confidence of both capital and labor in case of war between the two.

Sparks was in Sacramento exhibiting his thoroughbred cattle when he received a joint dispatch signed by both Sweeney and Davis to come up and head the ticket.

Next day Sweeney, representing the Democratic party, placed Sparks in nomination, and Davis, representing the silver wing of the Fusion party, seconded the nomination. Both these gentlemen made strong speeches of indorsement and Davis asserted that Sparks was the man to head the fight, as he was "fully a thousand votes stronger than any other man in the State of Nevada." This assertion proved true, for he ran more than a thousand votes ahead of his ticket and led all his associates to victory.

Another illustration of his sterling ideas of business probity was when Sparks called upon the Board of Equalization in Washoe County and demanded that they raise the assessment on his cattle on the grounds that they had been assessed too low. He was not satisfied until they had been advanced on the assessment roll fully 50 per cent. In these days of wealthy men resorting to perjury to escape taxation, his act shines out like a diamond.

The Great Rise in Wheat.

The wheat situation is one that is interesting the American farmer today. The prospect for the growers of this cereal is of the brightest nature. The phenomenal rise in wheat and flour that has taken place lately has brought great prosperity to certain regions where the blessings of water have not been enjoyed as they have been in the irrigated sections and the growing of cereals has been generally depended upon. Foreign demand has caused the raise. Dollar wheat is no longer a longing that partakes of the nature of a dream. More than twenty years ago when wheat took its great tumble, going down to the neighborhood of $1 a hundred in the West, it was predicted that it would never be worth growing again, except on large sections of land where it could be scratched in cheaply and harvested at a minimum expense. The combined harvester came along to solve the matter of expense to a certain extent by reducing the cost of heading and then threshing with a steam outfit. "India and Canada alone have enough wheat producing land to keep the world supplied and Canada has enough land unbroken to double the present production of wheat" was the cry of the pessimists. They did not figure on the increase of the world's population, and especially of that of the United States, nor on the reduction of the wheat-raising areas as diversified crops received more attention.

Drouth in India and Australia and the fact that no wheat was obtainable from Manitoba have been largely responsible for the recent rise in prices. Frost in Manitoba rendered the Manitoba crop below the milling grade and the United Kingdom found herself short after the Continent had absorbed our supply early in the season.

While the farmer is jubilant the city dweller must pay. Flour has, of course, soared upward with wheat and a ten-cent loaf of bread, together with a reduction in the size of loaves may be natural consequences.

Too Technical to be Valuable.

Too much technical expression in bulletins issued for the farmer who may not have an education covering all the scientific expressions, or is too busy planting corn or bringing up chickens in the docile path to remember them, is seriously objected to by an Eastern agricultural exchange. It takes up the cause of the farmer as against the mystery literature of a government bureau as follows:

How many of our readers understand this?

"The composition of the solid resulting from the decomposition of a phosphate lime depends upon the composition of the solution. If the solution is very rich in phosphoric acid, the solid is monocalcium phosphate. If water be now added to the solution the solid is dicalcium phosphate, and if the solution be very greatly diluted, there is a decomposition to a solid less rich in phosphoric acid than dicalcium phosphate. This decomposition may even go so far as to yield a solid less rich in phosphoric acid than would be represented by the formula $Ca3\ (PO4)\ 2$."

This is only one paragraph of a 64-page bulletin on phosphate issued recently by the bureau of soils of the United States department of agriculture, and the remainder of the bulletin is about as clear to the average practical farmer as this is.

The editor does not proceed to translate the mysterious item for the benefit of his readers.

Lee Estate Experiment Farm.

The lowland portion of the old Arlington Estate, once owned by General Robert E. Lee, and now being used as the experiment farm of the Department of Agriculture at Washington, has many interesting features—agricultural, horticultural and floral. While the main idea of the farm is substantial utility experimentation, some striking ornamentation has been done here and there, about the house of the superintendent and some of the farm buildings. These, too, have their real use, as fortunes are expended every year for ornamentals, while mere ideas of effective arrangement are oftentimes highly paid for. In one place, near the main flower house of the farm, is probably as handsome a bed of fall annuals as can be found anywhere—a great bank of cannas and castor beans edged with coleuses the tallest of which stands twice as high as a man.

The State convention of the Water and Forest Association of California, which met recently in Petaluma, was well attended, every county being represented. Needed legislation for preservation of the forests was discussed. The resolutions adopted indorsed the forest policy of the State, recommended measures for enforcing better logging regulations to secure second crops of timber and approved a plan for aiding private landowners that wish to plant trees. It was suggested that the expense of providing against forest fires and extinguishing them be borne equally by the State and the counties affected. The enthusiasm of the delegates showed that the people of California are becoming well awakened to the necessity of conserving the forests, which protect the snow in the mountains, helping insure a supply of water in the summer when it is most needed.

The booklet issued this year by the Forest Service of the United States Department of Agriculture on the "Use of the National Forests" should be an aid to the work of preserving the timber for the people. It tells all about the making of national reserves and what they are for and gives information about fire protection and other matters in connection with them. The booklet is neatly bound in a red cover and contains much valuable matter in a few pages.

NEW MEXICO PROJECTS

Carlsbad Farming Area is Given a Permanent System

GOVERNMENT RECONSTRUCTS OLD WORKS ON SUBSTANTIAL BASIS AND ASSURES FULL AND UNFAILING WATER SUPPLY FOR FIELDS AND ORCHARDS OF THAT FRUITFUL SECTION.

EDDY COUNTY lies in the southeast corner of New Mexico, being bounded on the south and east by Texas, latitude 33 degrees north. Its area is 5505 square miles. About 160,000 acres are patented, the assessed valuation of which is about $725,000 and the improvements about $700,000. The population has increased since 1887 from less than 500 to over 10,000 people. The altitude in the valley along the Pecos River is about 3100 feet. To the west the Guadaloupe Mountains rise to about 9500 feet. To the east and north is a range of hills and low mountains, effectually shutting out the cold piercing winds of winter.

Thirty years ago this section was given over entirely to stock raising. Attempts at irrigation were made from time to time with very encouraging results, but no serious effort was made to develop water for irrigation to any considerable extent until in 1888, when Charles B. Eddy and Joseph S. Stevens built a diversion dam just above the site of the present Avalon dam, and carried water about six miles to a beautiful tract of land now known as La Huerta. They incorporated the Pecos Valley Land and Ditch Company. Their plans for development were modest, and contemplated at the utmost the reclaiming of a few thousand acres. About $30,000 was expended in construction.

At this time Charles W. Greene, of the Santa Fe *New Mexican* came through the valley in search of data for a write-up. He met Eddy and learned his plans and difficulties. Greene quickly grasped the great possibilities of the valley and conceived the idea of constructing irrigation works on an immense scale for reclaiming all the land in the valley from Roswell to the Texas line. He gave up his newspaper work and went to Chicago, where he succeeded in interesting men like R. W. Tansill and G. B. Shaw. The Pecos Irrigation and Investment Company was incorporated with a capital of $500,000 to conduct strictly an irrigation business. Under the direction of Greene as manager and engineer work was begun at once, but it soon became evident that more capital and practical, experienced men were needed. J. J. Hagerman, of Colorado Springs, was approached and became interested and proceeded to furnish all the necessary funds on condition that he was given full control. The Pecos Irrigation and Improvement Company was incorporated with a capital of $1,750,000 for the purpose of buying and selling lands, as well as to deal in water rights and water delivery. Contracts were let for constructing the northern canal in Chaves County, the main and southern canals in Eddy County, and the diversion dam at Avalon. Carlsbad, then called Eddy, was platted in 1889. Seldom has a proposition started out with such fair promise, handled by men of ability, supplied with ample capital and having unbounded faith in the undertaking.

Panic of 1893 Stops Original Work.

Work proceeded rapidly and in a comparatively short time water was ready to serve to the lands. Investors came to occupy the lands and to develop the resources of the country. A railroad was built from Pecos on the Texas Pacific through the valley. Then came the fatal year of 1893. The panic caught these men in the midst of their great work of development. Money immediately became tight and development had to stop for lack of means. Silver depreciated in value and the famous "Molly Gibson" mine in Colorado

1.—Residence of Green Ussery. 2.—Residence of prosperous citizen. Carlsbad, N. M. 3.—Canyon Street. Carlsbad, looking north. 4.—Ampeopsis Veitchii. planted February, 1905, and Climbing Kaiserin Augusta, planted March, 1905. Top of window sash is 12 feet from the ground Residence of McQueen Gray, Carlsbad, New Mexico.

ceased to pour its wealth into the Pecos Valley to continue development. These men, however, did not lose courage, but stayed by the ship, yet, one by one, the various enterprises they had launched went to the wall. The Pecos Irrigation and Improvement Company struggled on until 1898, when it went into the hands of a receiver. A reorganization was effected and the Pecos Irrigation Company took over all the property of the old company in Eddy County and proceeded further to develop water and the country. However, in 1904 the floods that were so disastrous throughout the Southwest also destroyed a part of the irrigation works of this company.

1.—View of Pecos River, Carlsbad, N. M. 2.—Largest concrete aqueduct in the world across Pecos River. Carlsbad project. Over 500 feet long, 48 feet high. Arches 100 by 25 feet in the clear. 3.—Bass Pool, Black River, south of Carlsbad, N. M. 4.—One of the Public Utilities Company's power dams at Carlsbad, N. M. 5.—Shady drive near Carlsbad, N. M.

It was seen that it would take considerable money to repair the damage and the stockholders hesitated. At this time the United States Reclamation Service came to the rescue. Government engineers were sent to Carlsbad and they made a most careful examination of the old works, the lands, the water supply, and the agricultural possibilities. These were found satisfactory and the Government acquired the irrigation works, which it proceeded at once to repair and reconstruct, making them the best works that money and modern engineering skill could devise.

Government Reconstructs Entire System.

This project has two reservoirs on the Pecos River, the first at McMillan, eighteen miles north of Carlsbad, with a capacity of 58,000-acre feet, another at Avalon, six miles north of Carlsbad, with a capacity of 5500-acre feet; a total storage capacity of 63,500-acre feet, or water enough to irrigate 25,000 acres of land. The east side canal is about six miles long—the southern canal and its extensions below Black River about thirty-seven miles. The southern canal crosses the Pecos River in a concrete flume 513 feet long. This was originally built at a cost of over $50,000, and has been further strengthened and extended the past year. At Dark Canyon a steel reinforced concrete pressure pipe over six feet in diameter and 400 feet long carries the canal below the bed of the stream, thus avoiding the floods that caused serious trouble to the canal in the past. The dam at Avalon, the distributing reservoir, is over 1300 feet long and has been constructed with exceptional care. It has a concrete and steel core from rock bed to crest. Ample spillways have been provided to take care of floods many times greater than have ever been known on the Pecos River. Water is again being served to the lands, and the farms that were idle for two years are again beginning to bring forth bountifully.

There was a three days' celebration in Carlsbad in July in commemoration of the opening of the project. People from all parts of New Mexico gathered in that city and enjoyed the festivities. There were racing at the fair grounds, baseball, band concerts, a banquet and other diversions. Speeches were made by prominent officials and men that had taken an especially prominent part in bringing about the undertaking of the work by the Reclamation Service, and an era of great prosperity and advance was predicted for Eddy County and Carlsbad.

The work of constructing the Avalon dam was carried on by force account, no bids being received for the contract of building it. It sits at the head of the main canal system on the site of the old dam six miles north of Carlsbad. A portion of the old dam that was still standing and in first-class condition was utilized, the expense being lessened in this manner without any cost to the strength of the new structure.

New Dam Built After Most Modern Pattern.

The new dam is an earth and rock-filled structure. The core wall, running its entire length, is founded on bedrock and reaches to the top. From the bedrock to the surface of the water in the canal, which is twenty-four feet below the dam crest, this core wall is composed partly of rubble concrete and partly of heavy steel interlocking barsheet piling, the latter being driven to bedrock in such manner as to form a core wall in that part of the old dam where very deep trenching would be necessary in order to construct a concrete core wall on bedrock. From the top of this steel and concrete core wall up to the crest of the dam there is a vertical diaphragm of reinforced concrete, twelve inches thick at its bottom, eight inches at its top and twenty-four feet high. Bedrock is from ten to fourteen feet below the present low-water level of the river. The downstream side of the dam is a rock fill and the upstream earth slope is well paved with large stones. There are three spillways, two of which were considerably enlarged.

The main canals that the Government acquired by purchase from the Pecos Irrigation Company were "one-bank canals," having no upper bank. The width of the water surface varied all the way from 50 to 1000 feet and had widths even greater than this in crossing flat ravines. Being much out of grade, the water stood in them in pools, or rushed over shoals. The main canal was brought to uniform width by constructing an upper bank and to a uniform grade by cutting or filling in the bottom, as required. This work was carried out with such success that the canal is now an imposing waterway of good alignment and uniform proportions, through which the water flows in the most advantageous manner.

1.—Watermelons grow without care at Carlsbad. 2.—100 acres of Kaffir corn grown near Carlsbad. 3.—Cutting alfalfa on farm of L. F. Deifendorf, near Carlsbad. 4.—Seedless Sultana grapes. Vine belonging to R. P. Love, Carlsbad. 5 and 6.—Come to Carlsbad and help yourself to peaches. 7.—Apples grow too at Carlsbad.

The concrete flume through which the southern canal crosses the Pecos River was badly damaged by the flood of 1904. There was a very poor foundation under one of the piers in the river bed. This foundation had been washed away, causing settling and cracking. Excavations were made under it to a depth of eight feet and it was underpinned by a wide and heavy foundation of concrete on a grillage of railroad bars. All the other piers were strengthened by enlarging their bases. Cracks and breaks in the flume were all repaired. It is in better condition to-day than it ever was and capable of withstanding all assaults of the torrents.

Crude Works Replaced by Efficient Ones.

The water in the old canal was carried across Dark Canyon by a large shallow lake formed by an earth dam across the lower end of the canyon. About one-quarter of the water it carried was lost by percolation. It was necessary to maintain two spillways in the embankment with an aggregate width of 600 feet because of the heavy floods that swept through the canyon. There were frequent breaks in one of these. The canal was double-banked and brought to a uniform section at this point by the reclamation engineers, and a gap for the passage of the storm water was left at the deepest part of the canyon. It is here that the pressure pipe, or syphon, already mentioned, has been put in. The pressure was obtained by regrading the canal above and concentrating the surplus fall at this point.

The work of reconstructing the Black River, or East Side, canal, which is a separate part of the system and takes water by direct diversion from the Black River to about 1000 acres under the project, was begun in March, 1906, and completed May 22 of the same year, on which date the water was delivered to the farmers. About six miles of canal were reconstructed and 4000 feet of concrete lining were placed at the upper end. The canal, as it was found, was so leaky that it delivered but a small percentage of the water that it took from the river. It now appears to be water tight and is delivering a full supply for the 1000 acres it covers.

As a summary it may be stated that the work carried out by the Reclamation Service to bring the Carlsbad system to the state of capability that it is in to-day consisted of making a new gate structure and other improvements at the McMillan reservoir, rebuilding Avalon dam as a substantial structure and providing ample spillways, repairing and rebuilding the entire system of canals and laterals; constructing headgates, stormgates and lateral gates of concrete and iron for the canal system; repairing the concrete aqueduct across the river; building the concrete and steel inverted syphon across Dark Canyon, and reconstructing the Dark River canal.

Water Supply Ample and Unfailing.

And the water is there. The Pecos River is a living stream that at its lowest known stage carries annually 150,000-acre feet of water. The water supply was fully investigated by Government engineers and the title to the water carefully examined by Government attorneys before a dollar was expended or a cubic foot of concrete laid. Therefore, with works of the character that the Government has constructed here, and an ample and certain water supply, the farmer under the Carlsbad project can plant and know what the harvest will be.

1.—Country home near Carlsbad. 2.—Residence W. P. Mudgett, near Carlsbad. 3.—Residence of William Beverly, Carlsbad. 4—Residence of W. H. Merchant, Carlsbad. 5.—Residence of Francis G. Tracy, Carlsbad project. 6.—Eddy County Free Hospital at Carlsbad. N. M.

Lands Under the Carlsbad Project.

Over 47,000 acres of land were subscribed under the Carlsbad project. Out of this the Government selected 20,000 acres, the cream of it all. This selection was made with great care by the engineer of soils of the Reclamation Service, and it was based on data obtained by a series of examinations extending over a number of years. In the spring of 1906 the engineer of soils made the final examination, spending months in going over it in detail, cutting out something here, another tract there, till he had a list of the choicest lands under the canals. This classification of the lands by the Government itself is of value to every owner of land under the project. Not all land that looks well is valuable for agriculture and often is the homeseeker deceived by appearances, while here he has the report of Government experts on the character of the soil of any tract that he may wish to buy.

Soils of Project Very Productive.

The soil is generally a sandy loam underlaid with gravel or rock. It varies in depth from three to twenty feet. It is easily worked and responds well to cultivation. It retains moisture well, as a properly cultivated field of corn will continue to grow steadily for weeks without rain or irrigation. In an arid country the soil is lacking in humus, as the native vegetation, being scant, adds little or nothing to it. This, however, is readily overcome by growing alfalfa or other leguminous crops and by applying barnyard manure, which improves the mechanical condition and shows a marked effect even the first year. All soil comes from the grinding up and disintegration of rock. The Pecos Valley soil has its original strength. The rains have not leached it, but it is as the great mills of the ages left it.

Farm and Orchard Products.

The variety of products that may be raised profitably under the Carlsbad project is unusually large and the tiller of soil may choose what suits his taste and inclination. This point is important, as in most sections only one or two crops are staple and grown as a money crop. It is worthy of note that what grows best here is high-priced and therefore most profitable.

Fruits of Perfect Type Grown.

This district is the peer of any in the United States in producing perfect fruit in great variety. Local conditions, the climate, soil, protection from severe frosts and icy cold winds, moderate altitude, abundant sunshine, moisture at proper time, give fruit flavor, texture, color and keeping qualities that are unsurpassed. Deciduous fruit of every variety, as far as tried, grows to perfection. There is no danger of the over-production of fruit, especially of the quality produced under the Carlsbad project.

Peaches of Carlsbad at the top.

Its delicious flavor and richness of color, its shipping qualities, places the Carlsbad peach at the top. Year after year in competition with peaches from the favored peach districts in the West it has brought the highest price.

Apples.—The Pecos Valley apple must be seen and tasted to be fully appreciated. It simply attains perfection in color, shape, texture and flavor.

Pears.—It grows to a remarkable size, and at the same time is perfect in color, texture and flavor. To really appreciate the Bartlett pear the Pecos Valley product must be seen and sampled.

Plums.—Many varieties of plums have been tried. The quality is the best and the productiveness is remarkable.

Grapes.—Many varieties have been tried and none have failed to produce abundantly and of the best quality. Soil and climate seem especially adapted to the culture of the European grape.

Other Fruits.—The nectarine, cherry, apricot, quince, persimmon, etc., reach the same perfection as elsewhere in the Territory.

Farm Products.—Alfalfa, the peer of forage plants, is the leading hay crop. It is cut four to five times each year, and furnishes some pasture besides. One hundred acres of alfalfa means busy times haying from May 1 to late in the fall, as one cutting is hardly out of the way till the next is ready for the mower. The yield will average over one ton to the cutting, while many fields produce over two tons. The market for hay is unlimited.

Kaffir Corn and Sorghum.—The first is grown for corn and fodder and it is a heavy yielder and gives better returns than Indian corn. Sorghum is grown for fodder, and is often planted as a catch crop. It is cured for hay or fed green, hogs, cattle and horses relishing the juicy feed.

Cotton.—Cotton produces well, three-quarters of a bale to the acre being not uncommon. The staple is of a fine quality and brings a good price. There are gins at Carlsbad and Florence.

Small Grain.—These have not been grown extensively, but the acreage of winter oats is increasing from year to year. It is a very profitable crop whether the grain is sold or fed to stock on farm.

Root Crop.—The sugar beet and other root crops seem especially adapted to this locality. The sugar contents of the beets is especially high.

Melons and Cantaloupes.—The perpetual sunshine hammers sweetness and flavor into the melon and cantaloupe. They are equal to the best that are produced anywhere in the United States. The uniformity, both of melons and cantaloupes, in size and quality insure a ready sale at the top price, even when the market is glutted with inferior stuff. Soil and climate seem to possess the essentials required for producing the delicate flavor and the fruity meat of the cantaloupe and for giving sweetness and crispness to the watermelon.

Dairying.—The dairying interest is in its infancy, but it is a source of certain and large returns. Alfalfa, kaffir corn and cottonseed make an ideal dairy ration that every farmer may produce for himself. The home market is a large and growing one. Butter finds a ready sale at 30 to 35 cents a pound the year round.

Poultry.—Poultry may be produced with less labor and at a lower cost than at any place in the North and East. Eggs will average 25 cents, seldom selling below 20 cents. Spring chickens find ready sale at $4.50 per dozen.

Beekeeping.—The alfalfa honey of Carlsbad has won a name. Beekeeping is exceedingly profitable and some who are devoting nearly all their time to bees make more money on the capital invested than in any other line of business.

Stock Industry.—Stock raising is still one of the leading industries of Eddy County. The open range to the east and west of the Carlsbad project carries thousands of cattle, sheep, goats and horses. The irrigation farmer who wishes to feed for the market can find high-grade steers and lambs on the range at a reasonable price. Pecos Valley fat lambs have topped the market in Kansas City and Chicago year after year.

Gardening.—Vegetable growing yields handsome returns. The Pecos Valley celery and asparagus are noted. By proper rotation the gardener may have something ready for the market every month in the year. Flowers grow profusely, shade trees and ornamental shrubs grow rapidly and in a short time the farmer may make the homestead a thing of beauty.

The Public Utilities Company.

This company owns and operates the telephone system for a distance of sixty miles from below Malaga on the south to Dayton on the north. The system has been extended and much improved the past year. This company also operates two power dams on the Pecos River, developing over 400 horsepower for light and power for Carlsbad and the surrounding country. The water works in Carlsbad are controlled by this company. Two deep wells have been sunk west of town supplying an unlimited amount of pure water. The system of mains is being extended, giving ample fire protection. About $50,000 have been expended in improvements the past year. The latest improved up-to-date machinery has been installed.

Carlsbad.

Carlsbad, the county seat, has a population of 2500. It is a striking example of what water and American enterprise can accomplish in the American desert. Broad streets, lined with wide-spreading shade trees, fine residences, modern business blocks, substantial public buildings, commodious hotels, two national banks, schools, churches, water works, sewerage system, telephone exchange, electric lights, ice factory, hospital, public library, three newspapers, commercial club, Masonic and Odd Fellows buildings, etc., tell a wonderful story of progress. It is a growing town and has made substantial advance, even the last two years. It is headquarters for the United States Reclamation Service, the district hydrographer of the United States Geological Survey for New Mexico, Oklahoma and West Texas, and the Guadaloupe National Forest Reserve. The agricultural, pastoral and industrial resources of the county are varied

1.---Cotton produces a bale to the acre on raw land under irrigation at Carlsbad, N. M. 2.---Farm scene near Carlsbad, N. M. 3.---"Carlsbad, the Beautiful," from roof of United States Government Building. Showing Court House and Schlitz Hotel of fifty rooms. 4.---A Carlsbad, N. M., peach packing shed, Rio Pecos Orchard. 5.---Bee keeping pays near Carlsbad, N. M. 6.---Wool from over 1500 square miles of free range comes to Carlsbad to be stored and shipped. 7.---Driveway near Carlsbad, N. M.

and their development will make Carlsbad a city. Carlsbad has a cosmopolitan population, nearly every State and Territory in the Union being represented. It is only the strongest and best people that have the courage to come into the forbidding desert to build a home, and for this reason the character of the population of Carlsbad is far above the average in intelligence, education and enterprise.

In Conclusion.

In this article it is only possible to touch in a general way on the resources of Eddy County. Here is ample room for the farmer, the fruit grower, the dairyman, the poulterer, the beekeeper, the gardener, feeder of cattle and sheep, hog grower, the breeder of fine cattle, sheep, hogs, horses and mules. Cheap power and cheap raw material are at hand for the manufacturer. The industrial resources of the county are many. Here is ample room for the business man and for the professional man. Taking the climate in connection with the resources of Eddy County no place offers anything better for a man seeking a home where he may enjoy life twelve months in the year and at the same time make a livelihood and lay a little aside for a rainy day.

The Carlsbad Commercial Club.

The Carlsbad Commercial Club will at all times take pains to furnish reliable information about the resources of the county.

Hondo Project Enriches Bountiful Valley of the Pecos

BEAUTIFUL REGION ABOUT THRIVING CITY OF ROSWELL IS GIVEN SPLENDID WATER SUPPLY AND NEW LIFE COMES TO THAT SECTION UNDER ITS INFLUENCE.

FLOWING ditches, fed by the plentiful waters of a river and the copious streams of many artesian wells are bringing the Pecos Valley in Chaves county, New Mexico, of which the bustling city of Roswell is the metropolis and central distributing point, into an unrivalled state of productiveness. In addition to the water supply already developed, which has been sufficient to create many beautiful farms, the government is about to turn a still greater flood upon the valley. It has one irrigation system ready for operation and another in immediate contemplation. The territory they are to cover embraces as fair a sweep of land for the making of substantial homes as can be found in all the country. The private work done has been sufficient to bring into a state of the highest cultivation a tract of land sufficient to support hundreds of families and bring importance to a lively young city, but there are more acres to be rendered prolific and more homes to be created through the work of the government.

The Hondo reservoir is the one that is now completed in the Pecos Valley and that to follow it is the Urton Lake Reservoir. The two will bring water to about 85.000 acres of land, five acres of which, properly tilled, so it is claimed, will make a comfortable living and money besides for a large family. Rivers fed by springs and snow that lies deep on the high mountains towering above the valley give an unfailing supply of water for all the lands that can be reached by the canals to be constructed. The conformation of the country is such that the engineers had no difficulty in finding thoroughly feasible reservoir sites, where the most lasting dams possible of construction could be put in. The Hondo and the Urton works are expected to be models among those constructed by the Reclamation Service.

The location of the Hondo Reservoir is twelve miles southwest of Roswell. The total cost of this project will be $275,000. The few obstacles that the government had to contend with in this place, so admirably arranged by nature for the introducing of an irrigation system, make it possible to obtain results beyond proportion to the cost. The land to be irrigated is immediately adjoining Roswell and there are 10,000 acres of it.

Urton Lake Project for the Future.

For the Urton Lake Project the government contemplates taking out of the Pecos River, north of Roswell, a canal running to a large natural reservoir in the direction of the city. From this the water will be conveyed south and distributed over the lands between the reservoir and Roswell. The number of acres that will be brought under cultivation by this project will be 75,000. The Urton Lake Project has been gone over closely by the government engineers, who have done all preliminary work and recommended that it be carried out.

Under the Hondo Project one person cannot acquire more than 160 acres of land. These lands, however, were selected by the government engineers for their extreme fertility and it is not probable that holdings will run above forty acres, as that is about all that one family can handle successfully. Ten acres will probably be an average holding. There is one man with three acres near Roswell, so it is said, that not only supports his family, but puts by $1,000 a year by intelligent use of the soil. It is said at Roswell that this man's profits one year were $3,000. The government regulations provide that the lands shall be sold only to actual settlers at the start. This prevents speculation and keeps the price within a reasonable limit.

Beauty of Pecos Valley Impresses Strangers.

Because of the few obstacles to be overcome, the Hondo was among the first of the government irrigation projects to be completed. With an estimated cost of $275,000 and 10,000 acres to be irrigated, it is easy to figure that the total cost per acre of the water will be $27.50, making the installments only $2.75 an acre per year for ten years. At the end of that time no further payments to the government are required. The figure given is one of the lowest that will be taxed against land under any of the government projects.

The beauty of the Pecos Valley makes a strong impression upon strangers and is a continued pleasure to those that reside within it. There is almost perpetual sunshine there. The climate is one of the finest to be found. There are beautiful driveways, shaded by interlacing trees, which grow to a great size in the valley. Lofty mountains, their highest peaks crowned always with snow and their sides covered in many places with heavy timber and cut by canyons that are full of scenic beauty, are seen 100 miles to the west. These mountains form a retreat for sportsmen and campers in the summer time. They are full of game and the streams contain fish in great numbers.

Commercial Club is Active Organization.

The business men of Roswell are a mercenary

1.---Scene on Berrendo River, 3 miles north of Roswell, N. M.
2.---Roswell Wool and Hide Co., Roswell, N. M.
3.---Irrigating Ditch, Roswell, N. M.

lot of fellows. They know that the more settlers they can bring into the Pecos Valley the more Roswell will grow and the greater business there will be for them. For this reason they are doing all they can to let the outside world know all about their wonderful valley. They want all the land occupied and they want all those who occupy it to be prosperous. They know the prosperity is there for the right sort of settlers and they are reaching after them. To facilitate this reaching they have organized the Roswell Commercial Club and many a family that is now happily situated in the Pecos Valley, surrounded by money-yielding alfalfa fields and orchards, owes its transplanting from some less smiling region to this organization. The Club is meeting with great success. It makes the claim with pride that it sends out nothing but facts in its promotion literature and that none who has come to investigate has ever found conditions other than represented. "We have all we claim," is its declaration. "All we ask is for people to come and see."

The Commercial Club isn't after the farmers alone, either. It says that as Roswell is spreading out and is full of business and money there are room and opportunity in that city for various enterprises for people with a little cash. It asks business men who want a change of location or a new place to build up with to pay Roswell a visit.

1.---Irrigation ditch, Roswell, N. M. 2.---Spring River, Roswell, N. M. 3.---Farm scene, near Roswell, N. M. 4.---The largest artesian well in the world, Roswell, N. M. 5.---Artesian well, Roswell, N. M. 6.---Orchard, near Roswell, N. M.

The most fruitful portion of the irrigated district of the Pecos Valley lies in Chaves county. It extends along the west side of the Pecos River and is nearly parallel with it. It is far from being an isolated section. It is brought directly into the world by adequate railroad connections. It is traversed by the Pecos Valley branch of the Atchison, Topeka and Santa Fe Railroad, which extends from Pecos, Texas, on the Texas and Pacific Railroad to Roswell, busy center of the region's industry, a distance of 164 miles, and from Roswell in a northeasterly direction to Amarillo, Texas. By this means the Pecos Valley has an outlet to Eastern and Southern Texas and to El Paso and the West over the Texas and Pacific Railroad through Pecos; and to Colorado, southern and eastern Texas, Kansas City, St. Louis, Chicago and all the East through Amarillo. With the enlightened class of people that is populating it and its close touch with the world, the Pecos Valley and Roswell offer all the social and educational happiness and advantages that can be found in any progressive community.

While almost anything in the way of a profitable crop will grow in the Pecos Valley, it is alfalfa that brings the quickest and surest money. It is the crop from which the new settler usually obtains his start and which makes him a good living while other crops that bring heavier returns are coming into bearing. Alfalfa means livestock and dairy products and these are a profitable source of income in any region where they can be produced successfully. It is said to be a wonderful region for garden truck and all sorts of fruits. Especially are apples grown in the Pecos in great abundance and of a quality and color that is said to approach as near to perfection as ever attained with this fruit, that, while accused of being the medium in the early fall of man, is devoured by him at this day with an avidity that shows no rancor over the past. Apples from the Pecos are said to be eagerly sought in the markets of the East and London, and because the supply is not sufficient to meet the demand, the prices are always high. Many new orchards are being set out, the people about Roswell seeing permanent profit in the production of this fruit. More will be said concerning it later.

Fruit Growing and Truck Gardening.

Roswell and the Pecos Valley wish to interest the farmer, orchardist and truck gardener. The people feel that the facts alone are a sufficient lure and that wherever they are learned another settler will be gained for this region. Cities are built up by the wealth produced in the countries around them—unless they be seaports, or great natural centers of trade—so, while Roswell is one of the most thriving of the younger cities of the Southwest and is growing in importance every day—first attention is due to the rich country that environs it and gives it in great degree—though Roswell is a mart that draws much of its wealth from afar—its life and hum. Thousands of acres of rich unimproved land surround Roswell, including government reservoir land, and all of it can be bought for from $40 to $60 an acre, while there is a great deal that can be had for much less, the development of water not being so easy on this latter. On the lands not watered by the government, water may be developed for from $10 to $15 an acre. This gives a perpetual water right, which is paid for only once. Water for the reservoir lands is supplied at a small annual cost for ten years, after which the government furnishes it forever, free.

It was a Kentuckian that made the first improvement and cultivation of land in the Pecos. He left the blue-grass beauties of his native state and found in this New Mexican vale what he thought a more desirable place in which to spend the rest of his days. This pioneer was John Chisum, who established himself in the Pecos in 1878. Mr. Chisum was searching for a place in which to raise cattle on a large scale and he found the now celebrated South Springs, flowing eighty cubic feet per second of cold, pure water. These form the Southspring River, which empties into the Pecos six miles east. Chisum acquired 7,500 acres of land, including the springs, and being then 400 miles from a railroad, hauled in cereals, young fruit trees and machinery with ox teams. The planting done then by this Kentuckian is the horticultural romance of the Valley. He showed by his husbandry what might be expected of the soils when watered. He did not overlook beauty and comfort, either. Shade tree slips stuck into the ground by him are today stately trees that screen with interlacing branches miles of driveways along the ditches.

Old Apple Orchard Bears Heavily.

The five-acre apple orchard planted by Chisum twenty-eight years ago is today one of the show-things of the valley. Those old trees, pioneers of the horticultural history of the Pecos, are sturdy veterans, with spreading branches and thick trunks, vigorous and healthy, bearing each year a heavy burden of the finest fruit. In all the years they have never known a disease and their fruit has always been perfect. The apple industry in the valley has reached great proportions since these Chisum trees began to yield their treasures and show the way. Results from all the orchards have been splendid.

Noting the productiveness of the Chisum apple trees the present owner of the ranch decided that there was big money in growing apples and in the winter of 1894-5 he set out a large orchard—450 acres. This orchard has been giving money returns for years and from it there have been sent to the markets of America and some of those in Europe thousands of bushels of as fine apples as any man ever ate. This orchard is now in what in other regions would be the zenith of productiveness, although the trees have not yet reached their full size or bearing capacity and the crops they produce are beyond those of fully matured trees in many other apple producing parts of the country.

The growing season is nine months in the year in the Pecos and apple trees come into bearing much earlier than in the North. The trees usually bloom early in April and the harvest of Fall apples generally begins about the middle of August. Jonathans and some other varieties are then ripe and sell at high prices, as they reach the market earlier than those of less favored regions. The harvest of winter varieties ends about November 1. Owing to their vigorous growth and freedom from fungous diseases, the apples of the Pecos keep as well as any grown in the North.

The "Hagerman Apples" are known from London to Texas. They have taken the highest honors at the great expositions. It is not claimed that Pecos Valley soil, water and sunshine will, without the aid of man's work, grow these apples. The natural conditions are there, but there must be work and intelligence applied to bring the fruitage. All methods must be skillfully applied, but the man who does not know anything of apple growing can easily learn how to produce them. There is always instruction and guidance if he will seek them. His own brains and application must do the rest.

As man is stronger here in the favored Pecos Valley, so is a fruit tree. For that reason an intermission in crops is far less frequent there than in the colder north, where man and tree are both taxed by the rigors of climate. "One year on and one year off" is by no means as common in the Roswell region as in the North. Because of the long growing season and for other reasons that time will make known, the trees recover their strength after one crop and are ready for another the next year. Their rests are few.

There is in the Chisum ranch orchard a block of 1,500 Missouri Pippin trees that had a full crop the fourth year after planting and have since borne four consecutive heavy crops of perfect apples.

Apples Shipped to Distant Points.

The Pecos Valley apples, though many are shipped to New York and London, are sold principally in Texas and New Orleans, in one-bushel boxes and in barrels. The rate of freight from the valley to the markets is reasonable and the service is good. Icing is not necessary, excepting early in the season. One thing that gives the Pecos Valley apples great advantage in the market as sellers is their bright red color. This color is produced by the cool nights and the sunshine almost every day in the Fall.

Here are some of the figures that you want, now that you have been told by the Commercial Club what a beautiful and productive place the Valley of the Pecos is: You obtain forty acres of raw land, with a perpetual water right. It will cost you, say $50 an acre. You don't have to wait long if you go right to work, to begin getting your money back and making profit. Alfalfa planted in September can be cut from three to four times the first summer, and will yield at each cutting from three-quarters of a ton to one ton an acre. This hay will bring an average of $10 a ton, or $30 an acre the first year. Next year the cuttings will be from five to six tons an acre, making a return of $50 or $60. Alfalfa can be cut, cured and stacked at $1.50 per ton. This leaves a net profit to the Pecos Valley grower of from $42 to $50 an acre the second year. Land with a good stand of alfalfa sells readily now for from $100 to $250 an acre. An additional income can be obtained by pasturing livestock on the alfalfa fields for four or five months in the winter. These statements are all conservative and in no way exaggerated, the Roswell Commercial Club says, and it will gladly refer prospective settlers to farmers who have already made their homes there.

Forty acres are as much as one family can successfully cultivate in this valley and it is enough to bring ease to a very large family, so productive is the land and so certain the crops. The advice is to plant twenty acres in alfalfa, ten acres in apples and pears and the remainder in celery, vegetables and garden truck. Here are the returns as estimated: Alfalfa, 110 tons worth $1,100; apples and pears, when bearing, for from $2,000 to $3,000 on the trees, while the celery and garden truck will give a net income of $2,000 more.

Celery is proving one of the great sources of quick wealth in the valley. A quality that cannot be surpassed in the world can be grown in this soil, it has been discovered, and the farmers have seized the opportunity without delay. This crop at the present time is declared to be netting some of the farmers $400 an acre, the gross returns being $600. The fine quality of the product creates a demand beyond the supply and it does not look as if the industry could be overdone.

The settler in the Pecos Valley has no fear of drought nor of too much rain. There can never be a crop failure. There is nothing in any season to prevent luxuriant growth and nothing to destroy it.

Artesian Wells Gush Unceasing Streams.

One of the beautiful sights of the Pecos Valley is formed by the gushing artesian wells, which send their silvery floods high in air and bring life to the land as they flow away in the ditches leading to the gardens and orchards. It was only eight years ago that the first large flowing artesian well was drilled, but now there are 525 of these titanic hydrants of nature gushing out from 18,000 to 250,000 gallons an hour each. These wells are from 240 to 3,000 feet deep and cost from $300 to $3,000. The deeper wells, having a greater flow, make up for the greater cost, as more land can be irrigated from them. Geologists have been employed to investigate and have agreed that the artesian flow around Roswell is inexhaustible. None of it is wasted. It does not come to the surface anywhere else than in the valley. The belt is only about ten miles wide and sixty miles long and is fed by so many streams and underground rivers and by the melting of the snow in the mountains on the west that there will be an abundance of water for all time.

It seems almost like comic opera to tell people who may read about Roswell and the Pecos Valley that nature will not only supply all the comforts of life, but will also do part of the work for the housewife, but it is a fact that power developed from a three-quarter inch pipe from one of these wells is sufficient to operate churns, washing machines and other mechanical appliances about the farm. It won't move the arms of a lazy man, though.

The following extract from a letter received from the Western Loan Manager of one of the largest life insurance companies of the United States is furnished by the Roswell Commercial Club: "I take pleasure in advising you that I have made full and thorough investigation of the lands included within the watered district of the Hondo Reservoir now being constructed by the government near Roswell. I am very much pleased with all the conditions attaching to these lands and I believe that they are certain to greatly increase in value over the prices that are obtained for them now. I know of no location in the Western country where investments can be made with equal assurance of advance in values. It is the intention of my company to make loans on these lands for the purpose of assisting settlers in development."

As soon as the extensive cannery which is building in Roswell is in operation a fine home market will be developed and the profits from the gardens will be even greater. Beans, peas, asparagus, pumpkins, tomatoes and berries will then be tinned and supplied to all the towns of the valley and sent to more distant places in this form.

Mr. Strong P. Johnson of Roswell has three acres of ground on which he raises garden truck. He says that besides making a good living for his family he puts in the bank from $1,200 to $2,500 each year. This is only an instance. There are many others, the Commercial Club says, that could be named as making fine profits from gardening. The promising valley is only in its infancy, it is asserted. The country is fast settling up. There are good lands to be had at even from $15 to $25 an acre and new settlers are taking them every day. None are dissatisfied.

No Blight Attacks Fruit There.

"The home of the big red apple and the juicy pear" is what the Roswell Commercial Club is proud to call the Pecos Valley. There is no blight there. An elevation of 3,600 feet, constant sunshine and abundance of pure water that can be turned on or off at pleasure, combine to bring fruits to perfection. Right at St. Louis, the Roswell citizens claim with pride, Missouri apples sold in 1904 at 50 cents a box, while Pecos apples brought from $1.25 to $1.75 a box. At the Inside Inn at the World's Fair a box of pears from the orchard of Charles Bremond of Roswell sold at the fabulous price of twenty-five cents for each pear.

Here is something from a well-known authority: Mr. Parker Earle of Roswell, for sixteen years president of the American Horticultural Society and for nine years last past a resident of Roswell says that owing to an unconquerable disease, the blight, the pear industry in America has become a rather discouraging one. This disease has almost extinguished pear production in most of the old states, he says. "The acreage in the entire country is not increasing," he continues, "hence I believe there is a fortune waiting for the men who will go into pear-growing—the best kinds, in the best place, in the best way. I was hunting the best place for a good many years. I believe I found it when I came to this valley. The soil is just right. The climate is the best I know of for this fruit. We have no blight—no sign of it. I have never seen such healthy trees anywhere else, and the fruit we grow is clean and fair skinned. I don't know of anything else as attractive as growing pears and apples near Roswell."

R. F. Barnett is a Roswell citizen that has made wealth from cattle raising. Nine years ago he woke up to the fact that his neighbors were making money out of apples. He essayed an experiment in the same line and planted forty acres. His trees grew without a setback and began bearing at three and four years. In 1904 he sold six acres of his apples on the trees, the buyer to gather them, for $2,000, or $333.33 an acre. He complains that he did not get what they were really worth. It does appear though as if $2,000 on six acres, with little labor is pretty good returns.

1.---Fifth Street, Roswell, N. M.
2.---30 miles of these cement walks, Roswell, N. M.
3.---Apple Orchard, Roswell, N. M.
4.---40 mile canal, Roswell, N. M.
5.---Artesian well and reservoir, near Hagerman, N. M.

Barnett has become a convert to the apple business and the profits are so alluring that he has begun to set out a 640-acre orchard.

Many Fine Opportunities in Roswell.

"Come down here and be shown" is the invitation issued by the Roswell Commercial Club. It says it will demonstrate the truth of everything in this article, for which it has furnished the facts. To look for yourself is the only way to determine whether everything is as represented, it declares, and this seems a very honest proposal. It also invites all that may be interested in the Pecos country to write to the secretary of the Club for any information desired. The rooms of the Club are at 102 North Main street. They are open at all hours and the visitor in Roswell is asked to call there immediately upon arrival and receive all information desired.

To the business man and the manufacturer Roswell extends an invitation to come and aid and join in the profits of its prosperity. Though only ten years old, this metropolis of the beautiful Pecos Valley has 7,000 population, wide-awake hustling people who believe that with the strides their city is making that it will soon be the greatest of all the cities of its part of the country. It has opportunities for all active people, its citizens say, and the man of small capital has excellent opportunity to make money there.

Roswell has four large public school buildings with thirty-eight teachers and 1,688 pupils enrolled. Besides the New Mexican Military Institute is located there. It is supported by the Territory of New Mexico and buildings and site embrace forty acres of ground. There are eight churches, three national banks with deposits exceeding $1,000,000; a large wool scouring plant, electric light plant, ice plant, gas plant, one daily newspaper with associated press reports, two weekly newspapers, United States land office and weather bureau, local and long distance telephone service, pork packing establishment, owned by local capital, six lumber yards, three wholesale houses and many other enterprises, besides all kinds of up-to-date stores. All the prominent fraternal orders have prosperous lodges in Roswell. A cannery and a creamery will soon be in operation. There are thirty miles of cement sidewalk. Regular automobile service is being established with tributary towns.

The Commercial Club announces that there are good openings in Roswell for a beet sugar factory, brick plant, cement and plaster works, tile works, large rock crusher, tannery, woollen mill, flour mill, fruit evaporator, large opera house and many other enterprises.

Besides its numerous other railroad connections, Roswell expects to soon have direct connection with Denver through the line to be constructed by the Santa Fe Central Railway from its present terminus at Torrance into Roswell.

Sweet Grape Wine.

This is a medicinal drink very beneficial to delicate persons when taken with pure olive oil. To prepare grape wine use as many grapes as wanted, wash and boil the same as for jelly. Drain off the juice and boil with half as much sugar, or sweeten to taste. While boiling skim and bottle for use. The bottles must be tightly corked, the corks dipped into sealing wax, and each bottle should be wrapped in a newspaper and placed in a cool place in the cellar.

New Mexico & Texas Project

Elephant Butte to Be the Largest Reservoir

FROM IT LANDS UNDER THE RIO GRANDE SYSTEM, EMBRACING 180,000 ACRES IN RINCON, MESILLA AND EL PASO VALLEYS AND MEXICO WILL BE WATERED.

THE Elephant Butte dam and reservoir that are to be the base of the great Rio Grande project are already famous, though the work of creating them has not really begun. The Rio Grande Project will be one of the greatest of the twenty-five approved.

Under the Rio Grande system water will be put upon 180,000 acres of land, a large part of which is already irrigated from ditches constructed before the Government took hold of the project. Of this land 110,000 acres are in New Mexico, lying in the Rincon and Mesilla valleys; 45,000 in Texas, with El Paso as the central city, and 25,000 in Old Mexico, the irrigation of which the United States guaranteed because of rights that Mexico had in the water of the Rio Grande River, the source of supply for this project. The expense per acre will be about $40.

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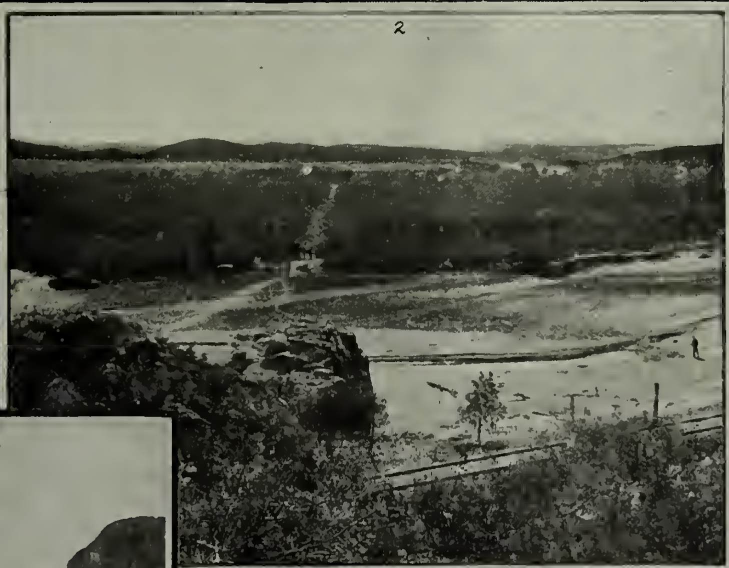
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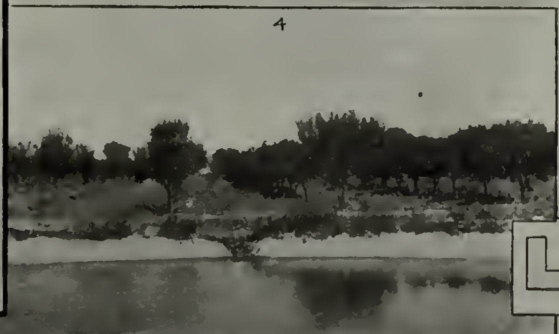
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1.---Excavation and construction of Leasburg Canal, looking down the north side of the river from Penasco Rock. 2.---Leasburg diversion dam site, Rio Grande project. 3.---Rio Grande project dam site, looking up the river. 4.---Residence and orchard of Mr. Barker, Rio Grande project.

The big dam that is to hold the water back at flood time and to be used by the farmer as he needs it will be constructed in a gorge at what is known as Elephant Butte, a picturesque point about fifty miles above Rincon that was always a famous landmark among the Indians and trappers. It is opposite Engle, New Mexico, and sometimes the dam is referred to as the Engle dam, and the system as the Engle Project.

The Elephant Butte dam, though not the highest, will be the ranking one in size among all the similar structures projected to date by the United States Reclamation Service, and not considering the Assouan dam in Egypt, which is of a weir type, the largest in the world. Its base will rest in solid rock sixty-five feet below the bed of the river, and the upper portion of it will rise 190 feet above low water. Its total width will be the width of the river, or rather of the gorge in which it will sit—1150 feet. It will taper like a wedge in order to accommodate itself to the rocky pass in which it is to be constructed, and at bedrock, far down under the silt, it will be only 250 feet wide. At the river bed it will be 400 feet wide.

The thickness of the dam is in an inverse ratio. At the foundation it will have a thickness of 180 feet of solid masonry and will gradually diminish, as the strain upon it grows less, until at the top it will be but twenty feet thick. The spillways are to be fifteen feet below the crest, giving a reservoir depth of 175 feet at the lower end. There will be a wagon road across the top of the dam.

The reservoir that will be created will also be the largest artificial body of water of this particular nature in the world. The Assouan reservoir may be said to be only the spreading of a river. It was the marvel of impounding works throughout the world until the United States took its coat off and went to work. The Elephant Butte reservoir will be forty-five miles long and the width of the valley that it will fill. This widens to several miles at its broadest part. The storage capacity will be 2,000,000 acre feet and 38,400 acres will be submerged by it.

It is not likely that it will ever be necessary to enlarge the storage capacity of this reservoir, as under the present plans its capacity will be far greater than needed to irrigate the 180,000 acres of land that are to be served from it, but if there should come a time when more water is needed the capacity of the lake could be increased to 4,000,000 or 6,000,000 acre feet by adding twenty or forty feet to the height of the dam. The dam, as it will stand, will capture the flood waters of the Rio Grande watershed above New Mexico and Colorado. The engineers have established the fact that the average yearly flow of the river is 800,000 acre feet. It is estimated that the lands under the system will require about 600,000 acre feet a year. This will leave a surplus of 1,400,000 acre feet if the reservoir is filled.

It is necessary to have a large dam that there may be no danger of the reservoir becoming filled with silt, of which the waters of the Rio Grande carry 2 per cent. Most of this will flow away with the water that passes through the sluice gates and be carried to the lands, which it will help keep in their present state of richness. There is no particular desire to have this silt on the land, which is mostly made up of deposits of that nature, but there is no way to get rid of it, and it would not do to let it settle in the ditches. Chief Engineer Hall estimates that it would take eighty years to fill the reservoir with silt to the level of 1,400,000 acre feet. There will need be no apprehension from the silt deposits, therefore, during the lives of the farmers of to-day.

Mexico's Venerable Canal.

For 300 years prior to 1880 the citizens of Mexico, at the El Paso border, had been irrigating about 25,000 acres of land, just over the line in their country, using about 60,000 acre feet from the Rio Grande. After 1880 diversion of the flow by Americans on the headwaters in Colorado deprived the Mexicans of a large part of their supply by causing a deficiency in the low water flow of the river at the head of their canal. The matter became a subject for international dispute. In lieu of the water diverted the United States entered into a treaty with the Souhern Republic, when it planned the Elephant Butte system, whereby Mexico is to receive forever from that great reservoir 60,000 acre feet annually. In return the Mexican government has waived all claim to water in the Rio Grande above Fort Quitman, in Texas, the end of the Rio Grande project, and all claims for damages from shortage of water in the past.

The United States Congress has appropriated the $1,000,000 that will represent approximately the cost of supplying Mexico with the water to be given her. It is expected that the balance of the $7,200,000 that the whole project is to cost will be appropriated by Congress at its coming session, as a loan to the Reclamation fund, in order that our treaty obligations with Mexico may be fully carried out, or the money will be derived from the sale of public lands as provided for in the general terms of the Reclamation Act.

Down the length of the mountain-inclosed depression called the Rio Grande Valley, through which the Rio Grande flows, are a chain of fertile smaller valleys that contain the lands to be watered. At the head of these diversion dams and reservoirs will be created to fill the distributing canals. The first of these open areas of rich land is Las Palomas Valley, the next Rincon Valley, then Mesilla Valley, extending down the river to the six miles of narrow way between the converging bluffs that is known as the "Pass." Beyond this the El Paso Valley of Texas and Mexico spreads out.

Leasburg Diversion Supplying Water.

During the interval before the stupendous task of constructing the Elephant Butte dam shall have been completed, the Government is going ahead with lesser units of the scheme. The first work of the project has been the building of the Leasburg Diversion dam and reservoir that will help serve 70,000 acres of land in the Mesilla Valley, much of which has been covered with a private system of canals, that have not, however, been adequate.

An allotment of $200,000 from the reclamation fund for prosecuting this unit was approved by the Secretary of the Interior in 1905. Water has already been turned into this part of the system, 15,000 acres being covered. The dam was built at Penasco Rock, near old Fort Selden, seventeen miles north of Las Cruces. The plans provide for a reinforced concrete weir 600 feet long and 30 feet wide, resting on piles and sheet piling, with Penasco Rock as its east abutment and a concrete pier at its west end. There is about 1600 feet of earth embankment at its west end. Sluice gates and headways have been provided at Penasco Rock and six miles of canal for connecting the head works with the existing ditches in the valley have been constructed. A change in the river channel has been made about one and one-half miles below Penasco Rock to confine the stream to the west side of the valley.

Rio Grande Dam Site During High Water

With the construction of the Elephant Butte reservoir the Government, instead of interfering with existing diversions in Colorado, which have caused a deficiency of water for irrigation not only in Mexico but in New Mexico and Texas as well, will utilize by storage the unappropriated water that now flows to the Gulf of Mexico periodically in enormous and disastrous floods.

It was to make the carrying out of the Rio Grande project possible that the Reclamation Act was extended to embrace Texas.

RINCON AND MESILLA VALLEYS

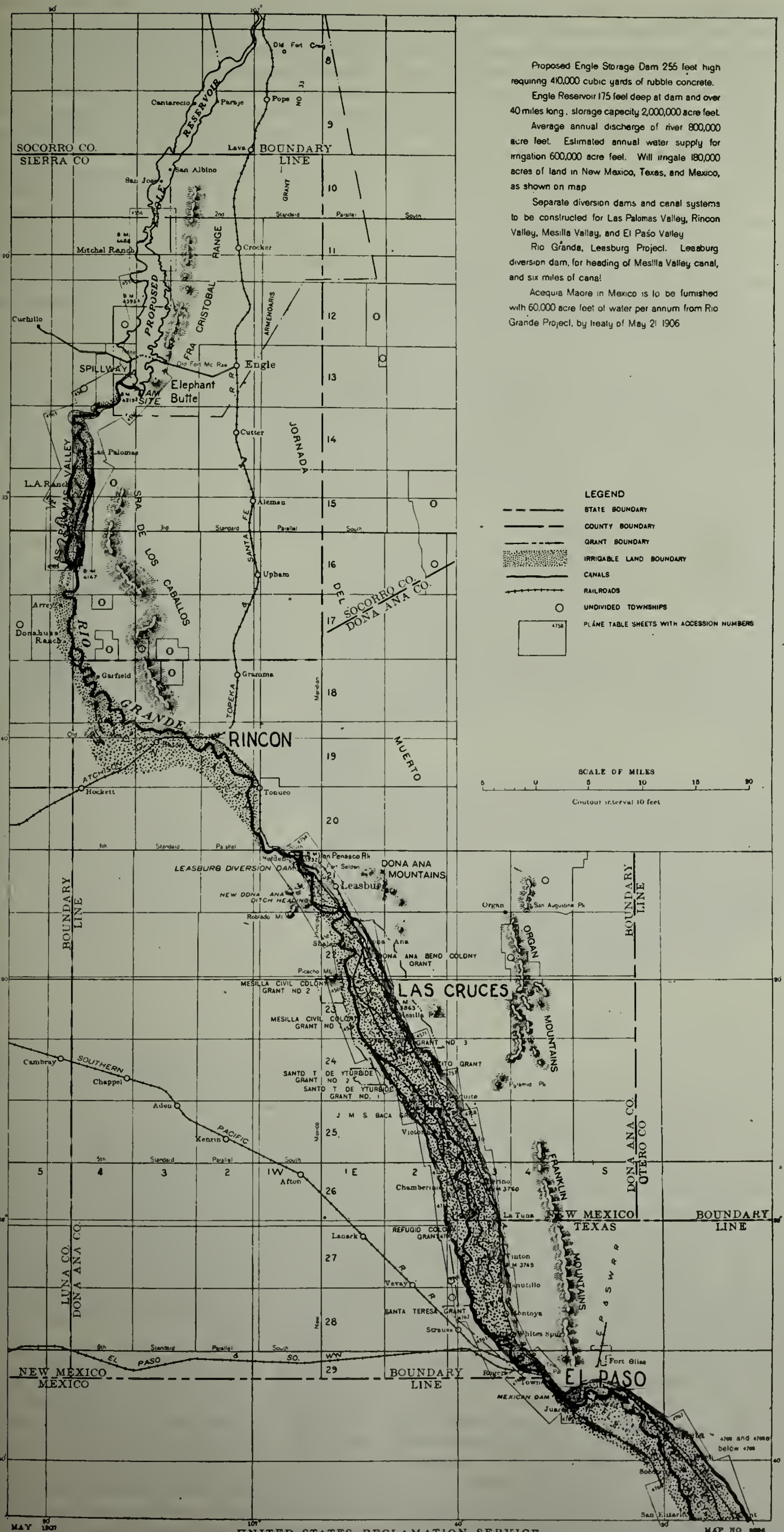
Under this gigantic reclamation project the ancient art of irrigation will be revived upon that corner of the United States which has the greatest savor of antiquity of any commonwealth within Columbia's borders. Desert spots that have been awaiting the murmuring voice of the water through the centuries will shake off their mummy clothes with the reclamation achievement of the infant Anglo-Saxon civilization in the Western World and emerge into joyous life in robes of freshest green. Lands already reclaimed by private enterprise will be given a copious permanent supply of moisture. A happy rural population and busy cities will be the early results of this magic. Homeseekers are already leaving regions of discomfort, hardship, and ordinary financial gain to establish themselves in this sweep of fruitful land that, through the ages, has been fed by the Rio Grande with rich cargoes of silt borne on its turgid tide, and is now to be given drink to satiation by that bountiful river.

The great reservoir will have a storage capacity sufficient to pour a sheet of water one foot in depth over an area three times as great as the State of Rhode Island. This is a great deal of water and the capture of it by use of the government lasso where the unruly Rio Grande is squeezed in the gorge should result in the growth of enough fruit, vegetables, alfalfa and other products of a rich soil to supply a kingdom.

When you contemplate a lake forty miles long with enough water in it to drown three small states and swelled besides by a river that feeds on the snow of the Rockies, it doesn't take much assurance of engineers to convince you that there will be enough water there to irrigate a very large tract of land, but it is well to have the figures for the sake of exactness. The government surveyors have announced, after the most careful work and gathering of data, that the Elephant Butte irrigation reservoir will store an abundance of water for the irrigation of the 180,000 acres of land having rights in this system, thus making it possible for thousands of those who now reside in the snow bound regions, where the blizzards grip the land in ice clutches in the winter and the humidity makes one gasp like a fish out of water in the summer, to procure homes in sunny, temperate New Mexico—a land where the frost never damages in the colder months and the dryness of the air in the summer precludes the possibility of the distressing "steam bath."

There in the "Land of Sunshine," where nature has bestowed her gifts with a bounty unrestrained the husbandman may spend his days and employ his energies upon farms having an adequate and perpetual supply of water, where there will be no crop failures caused by drouths; no sunstrokes, blizzards or cyclones, and where one can plant with an assurance of realizing a full reward for one's labor. To live in this region that has become known as the "Land of Sunshine" means a delightful existence. Health attends the resident and the greatest returns are received for the minimum ratio of toil.

It is expected that in the near future there will be an electric railway, with swiftly moving trains, down the valley from Elephant Butte dam, through



Proposed Engle Storage Dam 255 feet high requiring 410,000 cubic yards of rubble concrete.

Engle Reservoir 175 feet deep at dam and over 40 miles long, storage capacity 2,000,000 acre feet.

Average annual discharge of river 800,000 acre feet. Estimated annual water supply for irrigation 600,000 acre feet. Will irrigate 180,000 acres of land in New Mexico, Texas, and Mexico, as shown on map

Separate diversion dams and canal systems to be constructed for Las Palomas Valley, Rincon Valley, Mesilla Valley, and El Paso Valley

Rio Grande, Leasburg Project. Leasburg diversion dam, for heading of Mesilla Valley canal, and six miles of canal

Acequia Madre in Mexico is to be furnished with 60,000 acre feet of water per annum from Rio Grande Project, by treaty of May 21 1906

UNITED STATES RECLAMATION SERVICE
RIO GRANDE PROJECT NEW MEXICO
GENERAL MAP

Rincon and Las Cruces, as far as El Paso, Texas. The immense water power at the dam and along the canals will be used in generating electricity for the operation of this road. As the Elephant Butte reservoir will be the largest artificial body of water in the world, a sight that every tourist will want to see, and as it is very close to the famous Palomas Hot Springs, there is every reason why these places, in conjunction, should create one of the most attractive health and pleasure resorts in the Southwest.

Famous Las Palomas Hot Springs.

Las Palomas—meaning "The Doves"—Hot Springs, nestle in the foothills, on the west side of the Rio Grande, about five miles below the Elephant Butte dam. The waters of the springs are noted for their power to cure rheumatism and stomach, liver and kidney troubles. Hundreds of people visit the springs each year, traveling by team from their homes, there to enjoy the pleasures of camp life and bathe in these God-sent waters. Visitors who go there in the winter months find game plentiful. The cures the waters have made are said to be many and marvelous.

Rincon (the town is the junction of the Atchison, Topeka and Santa Fe Railway going south and west), or what might be called the Upper Mesilla Valley extends from the Elephant Butte dam site, above Rincon, New Mexico, along the borders of the Rio Grande to Penasco, seventeen miles below and contains 40,000 acres of exceedingly fertile land, of which about 15,000 acres are in cultivation being irrigated from the present community ditches.

The altitude is about 4000 feet above sea level, with lofty mountain ranges on either side. The climate is dry, the average annual rainfall for the last twenty years being only eight inches. The rainfall is so light that the farmers, while they cannot depend upon it, neither have fear of it. It does them little good and can do no damage. It would not produce crops in this region, but it comes often as a delicious purifier of the atmosphere, washing the foliage of trees and sprinkling the roads and the streets of cities.

The soil of the Rincon, or really the upper Mesilla Valley, is a sandy loam, and is so rich in plant food that it grows fruits, vegetables, melons, and other products of enormous size and of superior quality. There are few things from which the farmer, gardener and orchardist make a profit that will not yield well in this section.

The Fruits.

Especially have the peaches and grapes of the rich valley become famous in all the great markets of the Union. They command from the "fancy trade" the highest prices. The peaches are unexcelled for size and quality in the world, it is claimed. Every variety of grape is successfully grown there, including all sorts of raisin grapes. While these two fruits are grown with wonderful success they are not all of such products that the valley yields. Pears, apples, plums and all semi-tropical fruits are grown there and they bring the top prices.

Vegetables.

All kinds of vegetables thrive in a gratifying manner to the grower in this valley. Tomatoes can be made to pay the splendid profit of from $200 to $300 an acre. Celery is a golden crop. In flavor and crispness that produced in the Upper Mesilla is equal to any grown in Kalamazoo or elsewhere. Profits on this plant go higher, even, than those on tomatoes. They run from $250 to

$400 an acre. The onion has the same strength to the grower of a bank account that it has to the nostrils. It is the vegetable which holds the record for money returns, the farmers making $500 an acre off it in one season.

The soil is also well adapted to the cultivation of the sugar beet. From fifteen tons to the acre up can be produced. It may be well to announce right here that capitalists seeking a location for a beet sugar factory can find no better field for investment than in this valley.

As fine cantaloupes as ever grew at Rocky Ford in Colorado can be produced on the lands of this favored section. They are equal in quality in every way to the Rocky Fords, and have the decided advantage of reaching market earlier, the Mesilla Valley men assert.

All other vegetables, cabbage, sweet potatoes and watermelons do well. There are none to be excluded from the list of those that can be grown with ease and profit in this valley.

Grains.

Wheat, barley and corn are the most extensively grown of the cereals, and when properly cultivated, they produce heavy crops. Kaffir corn, rye and oats have been grown very little, but experiments have resulted in good yields of these grains.

Alfalfa.

The king of forage plants is an especially heavy producer on the fields of the Rincon Valley. Where alfalfa produces well there is always a certainty of profit for the farmer, even though he could grow nothing else. On these lands, it is said, it will yield, under the new irrigating system five cuttings a year and besides provide pasturage for stock four months in the year. This is a wonderfully prolific yield. The wholesale price of alfalfa ranges from $9 to $12 a ton. The demand for this desirable kind of hay is growing greater each year and the supply will never reach it, it is claimed. The markets right in the valley can take up more than is produced there.

Bee Culture.

The Rincon Valley is a land of honey. The industrious little bee has all sorts of encouragement there and he is busy all the long sunshiny day, storing delicious sweets for that time of blizzard that he imagines is going to come, but never does. He practically works on through a whole year of flowers, so he is a first-class producer for the men that relieve him of the results of his industry at regular intervals. Bee culture is a very profitable industry in this place. The broad and constantly increasing fields of alfalfa and the great areas of wild and cultivated shrubs, trees, plants and native flowers provide a great supply of sweets to reward the energy of the insects. The honey produced is of splendid flavor, as there are no noxious blossoming plants to injure it, and brings the highest price wherever sold.

Poultry Raising.

The climate and surroundings seem to satisfy the hen and the other creatures of the poultry world. Poultry farming will become one of the profitable industries as the valley settles up. Money is made from it now. Fowls will thrive with less care and expense there than in almost any other place in the world, is the claim made. The demands for poultry and eggs in the local markets are much greater than the supply.

Stock Growing.

The raising of stock is another industry of this part of New Mexico. The mesas and mountains on each side of the valley afford vast ranges for stock, which, owing to the mild climate, need no shelter and do well the year round on the natural feed. Sheep raising is virtually in its infancy in this particular section, but sheep will eventually be the principal livestock raised on the open ranges, which are pronounced excellently adapted for the growing of these flocks, as well as of cattle.

Building Material.

Stone for the erection of houses and other structures and a fine clay for making bricks can be obtained without difficulty from each side of the valley.

The Rincon Valley can boast of markets peculiarly its own and as it has no fear of competition, it can command the best of prices for all it produces. The yield of its soil can be disposed of in the numerous mining towns and camps contiguous to it. This portion of the valley lies between two ranges of mineralized mountains, the Black Range on the west and the Caballos on the east. Through these ranges are sprinkled the numerous mining settlements, which are the markets of the industrious farmers. The towns and camps in the Black Range, located on the west side of the river, are Cuchillo, Chloride, Fairview, Grafton, Hermosa, Andrews, Hillsboro—county seat of Sierra county—Kingston and Lake Valley. The markets on the east side of the river are Palomas Gap, Engle and Shandon, otherwise known as Goldfields.

There are two flour mills in the Rincon Valley, one at Hatch Station on the Santa Fe Railway and the other at Duran.

RINCON

Rincon is a junction on the Santa Fe and the distributing point for the valley. It is thriving on present resources and future certainties. Like all central points in regions that are to suddenly become unusually productive, it is the object of attention of people who desire the profits of rapid urban growth and is already beginning to feel the influence of the water that is to come. It has excellent hotel accommodations and modern mercantile establishments and other business institutions. Many carloads of alfalfa, stock and other products are sent out of this little city.

This is an excerpt from an article written by an observer that visited this fruitful locality:

> The Upper Mesilla Valley of the Rio Grande, Southern New Mexico, in the "Land of Sunshine," just before the government Elephant Butte irrigation dam and reservoir, offers many excellent opportunities for the investor and homeseeker. Those that invest in the cheap lands of this wonderfully productive valley will realize handsome returns. The man that establishes himself on a tract of this land will have a home in one of the most fertile valleys in the world.
>
> Southern New Mexico, with its delightful climate, its mild winters and cool, refreshing nights, where sunstrokes, cyclones and blizzards are unknown, is being recognized as the world's sanitarium, and with the completion of the government irrigation system for this valley, which will furnish an adequate and perpetual water supply, it will be unsurpassed in its agricultural products, especially fruit, alfalfa and vegetables.

The Chamber of Commerce of Rincon, New Mexico, will send all information desired to any person that writes to it.

LAS CRUCES AND ITS GARDEN

The Mesilla Valley, from which the bustling city of Las Cruces—"The Crosses"—seat of government of Dona Ana county, derives its growth, may well be likened to a vast garden, that will extend its area over many more thousands of richly soiled acres when the full flood from the government irrigation system pours over it. This garden, spreading out between the majestic mountain ranges over whose tops the few fleecy clouds of an almost perpetual spring float in the sunshine, like birds of soft plumage at play in the bowl of Heaven, gives invitation to the people of the world to come and make homes of delight and plenty for themselves. The invitation is meeting with response. This is a spot toward which thousands of pleased eyes are turned, where thousands of new people will soon be residing.

Emerging now, all titles cleared and a guaranteed possession for all those who seek lands, after eight years of paralyzing litigation, that halted the advance of this section, the Mesilla Valley is receiving its due and has awakened with alacrity to the call of progress. The way is all cleared, and natural conditions will bring the development that is to make the mountain side, sheltered vale and Las Cruces great as stock and farming community and city.

There are good markets for all produce that may be grown in this valley and railroads to carry the products to them quickly. The New Mexican Bureau of Immigration says in an official publication "Fruit picked in the Mesilla Valley one morning can be delivered in Denver the next, Kansas City in thirty-six hours and New York in fifty-two hours." These short shipments make it possible to leave the fruit on the trees until it has attained the best flavor and the price is 30 per cent better than that of fruit that has to be longer on the road. The quick transportation to the great Eastern centers of transportation gives the same advantage to all other products of garden and orchard.

Sure Profits for the Farmer.

Here is something about the future of orchard products that the person whose thoughts have turned toward the irrigated empire of New Mexico should read at the outset, for assurance of continued profit is as necessary as that of continued production:

> While the extent of territory and natural wealth of New Mexico guarantee prosperity for millions of industrious American citizens, the exceedingly limited amount of her irrigable land renders it impossible for the supply of fruits and other farm products ever to exceed the local demand. Needless to say, our fortunate Mesilla Valley farmers will profit all the more.
>
> The shipment of green fruits from California in 1880 amounted to less than $2,000,000, but in 1904 this had increased to $14,526,000; and yet, notwithstanding this enormous increase in the California output, the cost of foreign fruits imported into the United States in 1904 amounted to $19,000,000. Surely with this constantly widening margin in favor of the home producer, and with the population of the United States increasing at the rate of over 6000 a day, nothing more is needed to refute the pessimist's prophecies of over production. In fact, the demand for high class fresh and preserved fruits has increased to such an extent that in California good irrigable land in what is known as the fruit belt readily sells at from $200 to $500 per acre and upwards; some of the best land, where the water supply is reliable, even selling for as much as $1000 per acre.

Farming in the Mesilla Valley has no element of speculation about it. The only thing that taxes the genius of the grower is to choose those products which bring the largest returns. With the necessary labor applied, all crops will bring profit. It may be stated that there will be no results without effort. The soil will not yield big returns here without being properly worked, any more than it will elsewhere and the sweat of one's brow is the price of a bank account. The soil will respond with gratifying liberality, though, to the hand of the energetic tiller. The returns are enormous in comparison with the amount of capital and labor expended.

The farmers have an excellent guide, very near at hand. The New Mexico College of Agriculture and Mechanic Arts is situated in the Mesilla Valley and without expense to the settlers it is experimenting all the time to learn what the soil will produce with the greatest profit and is supplying this information free in printed bulletins. Tests of incalculable value to the farmer are being made all the time.

Apple growing in the Mesilla Valley is an industry that is developing rapidly, the orchardist having found that the profits from this fruit are heavy. The apples produced there are as hard and full flavored as any grown in New York state and many varieties attain a size, beauty of form and color and perfection of flavor not reached in the East. Each tree gives a phenomenal yield. At four years of age it is an exception if props are not needed to support the branches during the bearing season. Fruit growers from many parts of the world have expressed amazement at the extent of ordinary apple crops in this valley.

Wonderful Apple Orchards.

Those varieties of apples that do well in the Mesilla are the Early Yellow Transparent, Early Harvest, Red Astrachan, Carolina Red June, Summer Pearmain, Ben Davis, Missouri Pippin, McAfee's Nonesuch, White Winter Pearmain, Red Winter Pearmain, Winesap, Alexander, Spitzenberg, Rhode Island Greening, Maidens Blush, Bellflower and Northern Spy. Some of these varieties, which are soft and of inferior quality in the East, assume a different character in the Mesilla and become good shippers.

The climatic conditions are peculiarly good for the production of apples. There are no severe winters, the elevation is sufficient to prevent a sweltering summer heat, the atmosphere becomes entirely dry as soon as the sun sets. These conditions combine to make both summer and winter climate ideal for both animal and vegetable life.

Apple orchards of most varieties will be in heavy bearing the fourth and fifth year. The grower doesn't have to struggle on without an income from his land while the trees are growing. The rich alluvial soil, fertilized afresh with every watering, will bear other crops between the trees, without ill effects to either land or orchard.

The average results obtained from apples when they first come into bearing, according to the figures furnished, are 200 pounds of fruit per tree. There are seventy trees to the acre. At the lowest price ever obtained, 2 cents, the 1400 pounds from each acre bring $280. After a few years twice this result may be obtained.

Everything that has been said in the foregoing about apples will apply to the pear, it is declared. The size of this fruit is large and the flavor unusually fine in this valley. Garden and farm crops can be grown between these trees also at all times. Five-year-old pear trees are credited with yielding 150 pounds to the tree, of which 100 are set out to the acre. A ready price is 3 cents a pound. Simple arithmetic shows the returns to be $450 an acre. These results will be greatly exceeded a few years later, as with apples.

1---Ideal country home of D. F. Baker, three-quarters of a mile from Las Cruces. 2---The Loretta Academy, Las Cruces. 5---Passing view of Las Cruces. 4---Public School, Las Cruces. 3---Van Patten's famous mountain camp, fourteen miles east of Las Cruces.

The peach is an arboreal Methuselah in this valley. There are trees that have been yielding for sixty years and perhaps more. They laugh at time when the wind rustles their branches and each year extend from their venerable arms heavy burdens of the finest fruit. These "Viejos" were planted by the Spaniards at least sixty-five years ago. They are just as prolific and healthy as they were fifty years ago, when they probably reached their zenith.

Venerable Trees Still Bear Heavily.

The peach bears very early in this part of New Mexico. A few dozen peaches on a tree the year after it is planted is usual. Some varieties bear as much as 100 pounds to the tree the third year and the following year double that amount. Failure of crop or destruction by any agency is unknown there. Some of the varieties that have been found to yield abundantly are the Alexander, Amsden, Governor Garland, Mountain Rose and the famous Barley Seedling.

You can set out 100 trees to the acre and if at five years they yield only 200 pounds of peaches to the tree you derive a gross revenue of $600 an acre if you sell for only 3 cents, which is very much below the present ruling price for the best varieties.

There are some pioneer apricot trees in the valley that give evidence of what can be done with this fruit there. These patriarchs are older than very old men and are of a size attained by the rougher trees of the forest. They haven't asked much of man except some trimming and have grown sturdily through the decades, without cessation. Mexicans that are tottering to the grave remember picking fruit from these trees when they were children. Looking out of all proportion as single fruit trees, these giants seem equal individually to a whole corner of an average orchard and in the bearing season they glow like the breast of the oriole with a gorge of rich fruit. They are a source of great profit to their fortunate possessors and of wonder to the newcomer. The residents of the valley look for the coming years to bring it fame as the place of a giant race of orchard trees.

Plums, quinces, prunes and all small fruits and almonds grow well in the Mesilla, and the profits are good.

Bordeaux and Burgundy shall live over again in the Mesilla Valley, its citizens say. There the purple wine grapes come to splendid maturity under the kisses of an ever-temperate sun and the soil contributes to their juices all the flavor of the fairest vintage of France. The people that have planted vines to supply the tables and feed the presses tell how the experts from France visited the Mesilla and showed delight when they tested the grapes produced. "In this spot you will produce wines, under the guidance of experts, that shall rival those of our own land," they said. "Never have we seen a better quality of grapes for the making of many of the fine vintages, and experiment will find other soils to give the flavor to other varieties. In years to come it may be, if enough attention is paid to the industry, the Valley of Mesilla will be on the tongues of the connoisseurs."

Luscious Grapes for Table and Wine Press.

And then there are raisins. The people of this valley are convinced that there is no better place on earth—and they do not except Spain—for the production of this article of food, once a luxury, but coming into more common use every day. Experts from abroad have investigated the valley's capability of producing the raisin grape, too, and have pronounced it unsurpassed. The drying of the grapes is the important thing to consider, and there certainly is no place where they can be more safely dried. There can never be a loss while they are undergoing the process.

Then the table grape. The man in the Mesilla Valley smiles when the possibility of their being grown better anywhere else is mentioned, and he has an excuse for his assurance. Table grapes there attain great size and are often mistaken in the East for hothouse products.

A Mesilla Valley vineyard is a pleasing creation of bounteous Nature. The vines are large and healthy and the visiting Frenchmen are quoted as having said that they bear twice as heavily as the vines in France. A failure of the crop in such vineyards as have been planted has not been known, and the Spaniards grew grapes and made wines at their earliest arrival. The vines they planted are still bearing full crops.

Two years after setting out the vines in the Mesilla bear sufficiently to pay expenses. At the fifth year only improper cultivation will keep each of the 700 vines to the acre from bearing 20 pounds of grapes each. The 14,000 pounds are salable, according to the figures furnished in the valley, at 3 cents a pound—this is declared to be a low price—which gives a revenue of $420 an acre. The demand is said to be unlimited and it is stated that double the results mentioned may be obtained by turning the product into wine or raisins.

1.---The Agricultural College Buildings, Mesilla Valley. 2---A drive through the Agricultural College Farm, Mesilla Valley. 3.---Chrysanthemums grown in the Mesilla Valley. 4.---Sample musk melons grown under irrigation in the Mesilla Valley. 5.---Grapes grown by irrigation at the Agricultural College, Mesilla Valley. 6.---Cannas grown in the Mesilla Valley. 7.---View across the Mesilla Valley, from the Agricultural College. 8.---A young orchard under irrigation in the Mesilla Valley.

This is what Monsieur Pierre Vialla, professor of vine growing at the National School of Agriculture, Montpelier, France, says:

"I came to the United States * * * commissioned by the French Government to study American grape culture. * * * It really makes me homesick to see these vineyards (in the Mesilla Valley). It is a splendid soil for the purpose; it could not be better. The greatest enemy we encounter in France is the phylloxera, or root louse, *an insect that can never trouble you here* * * * With such a climate and soil, this valley can have few rivals in grape culture."

And these people of the Mesilla Valley boast of their cantaloupes, too, and challenge any region to beat them. It is that wonderful strip in Colorado where the canteloupes that have made the mouth of the nation water are raised that melon-producing sections usually grow quiet before, but a challenge comes even to Rocky Ford from this New Mexican vale. It doesn't do to take sides in a contest of this sort, so the statement made by the people of the Mesilla Valley will be given:

> Last year our cantaloupes sold in Denver for 10 per cent better prices than the Rocky Ford melons, and this year the Mesilla Valley melons are universally admitted to be the finest and "best sellers" in the market. The demand has far exceeded the supply. Our farmers plant their cantaloupe seed in hills four feet apart in rows eight feet apart—thus facilitating the necessary cultivation and irrigation—that is to say about 1300 hills to the acre. The vines of each hill bear about fifteen melons—19,500 per acre. The melons sell, locally, for 5 cents apiece. When shipped in carloads to distant markets they net the farmer about 3 cents apiece, or $585 an acre. The oldest and most experienced grower in the valley asserts that in this soil the melon crop never fails when properly cultivated.

The Ever Reliable Alfalfa.

And Rocky Ford doesn't care about this at all, for there isn't an acre of land to be sold there at any price within reason. The Mesilla Valley is pleased that this is the case, and it asks that every one that wants to make money off irrigated land study the figures of Rocky Ford.

Pecans and English walnuts set out as ordinary shade trees seven years ago are producing at the rate of $300 worth of nuts to the acre. Many farmers are setting these trees out along their roads and fences and some are planting quite large tracts of them, expecting to obtain good returns. It is probable that the planting of these and other nut trees, including almonds, will be gone into extensively.

The story of alfalfa is one of the oldest and most often told of any in connection with the tilling of irrigated lands, yet it is one that is ever an inspiration to the farmer. It is always a tale with a golden sequel for him. This forage crop, with its homely blue flower, is the loaf of bread in the cupboard of husbandry. One can not build air castles of wealth off one year's crop, as with some products of irrigated lands that are subject to soaring of prices, but he can figure on a sure and substantial growth of his bank balance if he cultivates alfalfa and of profits from the start. Wherever alfalfa has been planted in proper soil and with enough water the result has been one of gain. It has been a money-maker wherever it could be grown successfully. There are cattle and hogs to fatten if the grower does not want to make his profit off the hay.

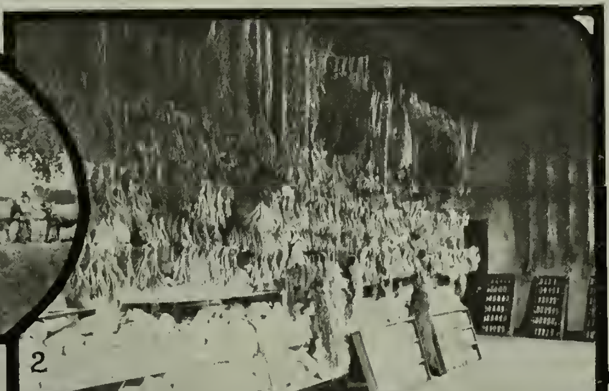
The claim is made for the Mesilla Valley that it has no superior among alfalfa regions. The fields there, it is said, usually produce from one to two tons per cutting and there are four to five cuttings each year. After the first year six tons an acre is declared to be a modest average. Oats or barley are often sown with it the year of seeding. What would otherwise be a light first year's crop is thus averted, as the mixed hay produced brings nearly as good a price as the straight alfalfa.

At $10 per ton the gross revenue from a product of five tons an acre is $50. The expense of cultivating alfalfa after the first seeding is not great, as about all the plant needs is irrigation. The price in this region during the late winter and early spring is often $16 a ton.

Onions Strong in Price as in Flavor.

Bermuda onions are sold in the Eastern markets at high prices, being deemed the best produced in the world. Some day the name "Mesilla" will hold an equal rank in onion nomenclature. The pungent tubers produced there are equal in every way to those of Bermuda. All they need is an older name. Astute market men of New York are now selling the New Mexican article as "Bermudas" and obtaining the same price. Fifteen tons an acre is the average crop of Spanish onions in the Mesilla. With careful methods this is often exceeded. They bring 2 cents, or $600 an acre.

Off one acre of land farmers have taken $750 worth of sweet potatoes. This seems to be a most suitable region for this product. If the crop is stored during the winter and sold during the spring and early summer, very high prices can be obtained.



1.---A Mesilla Valley herd at the Agricultural College, Mesilla Valley. 2.---Exhibit of wheat and other products grown at the Agricultural Experiment Station in the Mesilla Valley. 3.---Baling alfalfa, Agricultural conal, Mesilla Valley. 4.---Corn grown under irrigation in the Mesilla Valley. 5.---Experimental tests of onions in Mesilla Valley. 6.---Macaroni wheat grown under irrigation in the Mesilla Valley.

Asparagus, one of the most delicate and healthful vegetables known to the epicure, and which graces the tables of the wealthy at whatever season it can be procured, no matter what the price, grows in its finest form and flavor in the Mesilla. It probably has the record in this valley for marvelous cash returns. This plant root attains great size there and is of the white, tender, succulent nature that dealers prize so greatly. It requires but little care after planting. The portion of the crop that reaches the Eastern cities before winter has completely unloosened his cold grip there brings immense prices, a small package bringing $1 or more. As is well known this vegetable is even better when canned, and in this form that which can not be sold fresh brings a high price.

A bed of asparagus in the Mesilla covering one acre is said to have yielded after the third spring 200 pounds a day for sixty days. It brought 12½ cents a pound, a total of $1500 for that acre of land.

There is one way of making money through alfalfa down in the sunny Mesilla without growing it. That is by turning bees loose on your neighbors' fields. Even if they wanted to impound the insects, they couldn't do it and swarms gather the sweets from far and near. Sweetening wouldn't make the hay palatable to the cattle anyway, so the bees don't do any harm and your conscience needn't bother you while they store up money for you. This is the history that one farmer gives of his step into apiculture:

> I began with twenty hives. At the end of the first season I had sold 4700 pounds of honey at an average of 7½ cents a pound net, and my hives had increased to sixty-five. This year, at a fair rate of increase, I will make a profit of more than $2000.
>
> I have decided to devote my entire time to bee culture. The bees here require no winter care or feeding. They feed on fruit trees or cottonwood bloom in the spring and in the summer on the mesquite, golden rod and wild sunflowers, but their staple food is the bloom of the alfalfa. As this plant blooms and is cut four or five times a year the bees never want for material.

Another bee grower said: "I started with thirty hives and at the end of the first year had fifty-four. I had sold during the year $2225 worth of honey."

Pleasurable Pursuits for Gentler Sex.

The culture of rare bulbs and of cut flowers for the early Eastern market and the manufacture of perfumes is destined to be as profitable an industry in this valley as it is in the famous flower-growing regions of the south of France, it is thought. The choicest flowers bloom the year round and attain great beauty and size under cultivation in this region. Roses are never out of season. The culture of flowers and ornamental plants and the manufacture of perfumes have been made to pay commercially in regions less favored by nature than this valley.

A field of effort for women is opened by this suggestion. The female members of a family may add considerably to its revenue by maintaining a patch of flowers and rare plants and shipping the cut flowers in the season and the seeds and bulbs. There is many a woman of refinement in the cold East with a little income who may wish a pleasant existence and occupation under a sunny sky and in a balmy vale, and it seems that here is an opportunity for her. As a matter of fact the opportunity for general farming is very good there for women that have a little money to start with. Though they can not do the heavy work they can hire labor for that, and there are many things, such as poultry raising, apiculture and floriculture that they can busy themselves with. For women who feel that their strength is lessening in other climes there is the promise of robust constitution and enjoyable life in Southern New Mexico. One is always in close communication with the East there and after one is established there will be money enough for trips to the centers of denser population. One doesn't immure oneself when one settles in New Mexico, but only gains a delightful residence place for most of his days, with the prospect of making money enough to spend the others where the pleasures of great cities invite.

There are the daily trains with their luxurious accommodations to carry you whither you will. You can never be an exile there.

Las Cruces.

The city of Las Cruces itself is one of the most up-to-date of young communities. It is destined to be an important place as Dona Ana County grows under the swift influx of population. Money that seeks investment in town lots and business is already pouring into it. The rush that irrigation is to bring is starting. Las Cruces is beautifully situated on the eastern edge of the valley of which it is the metropolis. The population at this writing is 4000. The altitude is 3800 feet and the climate is magnificent. The city is already equipped with a new system of electric lights and a modern water supply is being rushed to completion to meet the demands of the increasing population. There is an ice plant with a large capacity, two flouring mills, an extensive fruit and vegetable cannery and two excellent hotels already in Las Cruces. Capital is looking over the field with a view to further improvement and enterprises. There is a high-class system of graded schools, churches of different denominations and four weekly newspapers, two published in English and two in Spanish. All fraternal orders are represented. Las Cruces has the distinction of being the seat of the United States District Court and the United States land office.

All questions concerning Las Cruces or the Mesilla Valley will be promptly answered if Professor Hiram Hadley, president of the Chamber of Commerce, or its secretary, are communicated with. Any farmer in the valley will confirm the statements concerning its wonderful productiveness.

In the literature sent out by the Las Cruces people are dozens of statements by farmers concerning the fertility of the land and the immense profits made. Here is something from a recognized authority that may interest intending settlers. It is by Francis E. Lestero of the New Mexico College of Agriculture and Mechanic Arts, whose long researches and experiments certainly qualify him to speak:

> Fourteen years of official connection with the Government Experiment Station of New Mexico have given me an opportunity to observe the advantages that the Mesilla Valley offers to its residents.
>
> I have seen, in the first place, the benefits of our wonderful climate. Scores of men and women have come out from the cold and damp of the Eastern States with little more hope in life than to linger for a few months, have been filled with new hope and energy, and in the course of a few months have regained almost perfect health. These people, almost without exception, had they stayed in their Eastern homes, would have been in their graves long ago instead of being as they are to-day, healthy and useful citizens, developing our valley.
>
> **Independence Soon Gained.**
>
> I have seen a young man starting out ten years ago with no more capital than good health and ambition and perhaps $50 in his pockets, first by renting, and later by buying lands accumulate enough to make himself independent for the rest of his life, as he is to-day; and all this by the growing of alfalfa only, a crop that is admittedly one of the least profitable crops per acre grown in this valley. Net profits of from $150 to $500 per acre are not fairy tales nor merely estimates on paper.
>
> The records of our experiment station show conclusively that the following profits per acre may be considered as conservative and reasonable from good land in our valley, provided with ample water supply: Tomatoes, $75; chili, $150; sweet potatoes, $150 to $200; onions, $250 to $500.
>
> Finer onions than have been grown in the last few years on the lands of our Experiment Station are not procurable anywhere, and yet these were grown on soil far from being the best in our valley.
>
> Our markets are probably above the average of those of other communities. With El Paso—a rapidly growing city of more than 30,000 population and within forty miles of this immediate locality—we have a market in itself that can use all the valley at present produces and what it is likely to produce for some years to come.
>
> I think there are few communities in our country so favored by natural conditions as this valley I believe that it offers to the man who will attend to his business as happy a life and as sure a means of earning a comfortable livelihood as any place in the world, while there is little doubt that he can achieve independence in the course of ten years.

To the sportsman the mountains and streams of Southern New Mexico offer all the attractions of big and small game and fish. Even wild turkeys are still to be found there.

City of El Paso, a Growing Metropolis of the Border

NATURAL ADVANTAGES OF LOCATION MAKE IT A COMMERCIAL CENTER, BUT IT EXPECTS GREATLY ADDED PROSPERITY FROM THE DEVELOPMENT OF WATER AT ELEPHANT BUTTE.

Of the 180,000 acres of rich land that are to be irrigated from the inland sea the government is creating at Elephant Butte by placing a titanic finger of masonry in the stream flowing through the ger of masonry in the stream flowing through the rock-walled channel of the Rio Grande, 45,000 acres are in the El Paso Valley of Texas and 25,000 in Old Mexico. In the center of this area that is to be brought into a state of cultivation that will equal the wonderful garden spots of the ancients, is the flourishing border metropolis, El Paso, already becoming one of the most important inland cities of the country, but full of ambition and perfectly willing to enjoy the added prosperity that the productive small farms of this area will bring her.

The coming of the Elephant Butte deluge, though, is not going to put the initial bloom on the valley lands below and above El Paso. Already that region is dotted with small farms in the highest state of cultivation, where gardens flourish and flowers perfume the air. Reclamation has been effected by pumping from the heavy subterranean flow that underlies the valley. Some wonderful results have been accomplished by this method of obtaining water. The expense has been far less than one would suppose, owing to the easy lifting that the pumps are called upon to perform. If the government had never taken up the great irrigation project that is to bring all the land into bearing with a rush, the El Paso region would have gone on progressing steadily under the pumping system. This city is already surrounded by a prolific agricultural and livestock country, as well as being a great mining center, but the coming of water in great quantity is going to multiply its productiveness many fold and give an opportunity to thousands of industrious settlers.

The Elephant Butte project is of such magnitude that the waters will flow through the canals on past El Paso one hundred and sixty miles below the dam, through the Rio Grande Valley, to Fort Quitman, forty-two miles east of the metropolis, where the project ends, after approximately 200 miles of territory have been traversed by the artificial waterways. It will be seen that there is opened up to irrigation a region capable of supporting an immense population in affluence and it may be seen also that El Paso, as the natural center of all this region, must prosper by the business poured into it, not only by the farming population but by all the thriving smaller cities that are developing throughout its length.

El Paso is not destined to build upon agriculture, stock raising and mining alone, though these in themselves are sufficient to create a city of great importance at this particular location. It is a commercial center and trade entrepot, to which all the region for hundreds of miles around, including a great slice of Mexico, must contribute.

Sea of Verdure and Bloom.

It is destined to be the great mart and supply depot of the section. Leaving the Las Cruces region and continuing on down the route of the canal system as it approaches El Paso, there is the same tale of productiveness and rich return for the tiller of the soil. The sea of verdure and bloom continues to widen its area as water sweeps about this city of the borderland and its waves roll on down the Rio Grande Valley, clear to the end of the watered region. El Paso draws from the gardens beyond it and is itself environed by a garden as rich as any of them. From East and North and South and West the "caravans" and the railroads bring goods for distribution and transshipment over local and distant territory, and this City of the Pass stands as certain of her prestige for all time as was ever any trade mart on earth. With her only competitors hundreds of miles away, she occupies a position that can never be shaken by rivals, her people proclaim.

The story of the Territorial and Texan Southwest will be the story of its natural gateway, El Paso. Here capital and enterprise will converge and turn the wheels of manufacture, feed the current of business and every productive part of a wide region will contribute to create a splendid city. The mining industry alone would insure an important business center.

The history of El Paso is one of the romances of the development of America's outer lands. It was naturally located in its infancy where the trails from different directions had to converge—the one feasible place for a trading station. The emigrant of the South had to go by this town on his way to California; and all the freights to Mexico that went in over the Santa Fe trail were taken across the river here. When the iron roads seeking the business of this region destined to give them heavy traffic, built that way, they had to meet at El Paso. As a babe this place controlled the commerce of the region and as a city she will continue to have an absolute grasp upon it.

In 1598 Don Juan de Onate, one of the pioneers of the Spanish conquistadores that took what they coveted of the fairer regions of New Mexico, crossed the Rio Grande, also called the Rio Bravo, and named the ford and the trail that it led to, Paso Del Norte. A settlement named for the crossing and the pass in the mountains to the north sprang up on the present site of Juarez, missions being established along the route near the middle of the seventeenth century.

A permanent presidio—Spanish military post—was established at the pass in 1863, when the Spanish forces retreated before the attacks of the Pueblo Indians of New Mexico. Recognizing its strategic importance, the United States established a full regiment on the side of the river opposite Juarez after the Mexican war.

There were no buildings on the present site of El Paso until 1827. From that time until the treaty of Guadaloupe Hidalgo, which constituted the Rio Grande the international boundary below Paso Del Norte, that site was a hacienda held under a Mexican grant. At the time of the American-Mexican treaty an American secured possession and a town named Franklin, consisting of a few adobe houses, was born.

The Beginning of El Paso.

In 1860 a better effort to establish a town began and the name El Paso came into being. Up to 1880 the inhabitants numbered only a few hundred, however, most of them being Mexicans. Then in 1881 came the railroad. From that date the advance was faster and within the last few years the growth of El Paso has been one of those marvelous developments in the history of the more progressive of American cities.

This brief table of distances shows what a wonderful trade position El Paso holds and how little rivals can do to take away any of her commerce. The nearest points of relative importance are as follows: San Antonio, 623 miles southeast; Fort Worth, 615 miles east; Pueblo, 716 miles north; Los Angeles, 812 miles west; City of Mexico, 1224 miles south.

The quaint Mexican city of Chihuahua is 224 miles south. It is nearly as large as El Paso. It sends quantities of goods through the American city and buys many supplies there. El Paso also derives revenue from the many tourists and other travelers that pass through there on their way to Mexico and California.

These are the railroads that bring bustle to El Paso: Santa Fe, entering from the north; Galveston, Harrisburg & San Antonio, from the east; Southern Pacific from the Pacific Coast; El Paso and Southwestern, connecting with the Rock Island system at Tucumcari, N. M., by which route through trains are operated between Chicago and Southern California, and extending to Bisbee, Douglas and Nacozari, the great copper camps of Southern Arizona and Sonora, in Mexico, from the northeast; Mexican Central and Sierra Madre lines from the south; the Texas and Pacific from the east.

Public Schools of El Paso

The 'Frisco will probably extend its system to El Paso soon, and an extension of the Denver & Rio Grande is expected to reach the city ultimately. So important has El Paso become as a railroad center that one of the finest union stations in the country has been erected there. It presents one of the liveliest scenes, with the rush of trains and throngs of people to be seen in all the busy West. A road is being surveyed from Kansas City to El Paso, which will cut the distance 250 miles and the Spreckles road is building there from San Diego, through Yuma.

All the mining region of the southwest must pay tribute to El Paso, for there is located in that city one large smelter. Ore to be reduced there is shipped from the mines for hundreds of miles around, the railroad facilities being such as to make the city accessible to every important mineral section contiguous to it. Thousands of dollars are thus disbursed in El Paso annually, the smelter employing a large number of men and having a heavy payroll.

The fuel problem threatened to be a continual handicap to El Paso's manufacturing progress until the discovery of oil in large quantities at Beaumont. Since that time the use of fuel oil has been extended in the city and it has been found sufficiently cheap to give a great stimulus to manufacturing. Coal deposits have been discovered in the vicinity and these will be supplying fuel in commercial quantities in time.

Prospects of Oil Discovery.

But of far greater importance to the city is the prospect of the discovery of oil in commercial quantities much nearer to it. In the Pecos district, 100 and 200 miles east and northeast of El Paso, including the eastern end of El Paso county, the geological and surface indications of oil, including seepage and oil strata struck in boring water wells, indicate great petroleum deposits there. Should large flows of oil be discovered this close, the manufacturing advance of El Paso would be tremendous.

While on the subject of fuel and manufacturing the smelting industry should be given more attention. One large smelter employs from 600 to 800 men and has a payroll of from $40,000 to $50,000 a month. This company, in addition to paying out this money for labor, which helps swell the business of the city's retail merchants, makes a much more important distribution of coin. It pays to shippers of minerals from the tributary country $800,000 to $1,000,000 a month. The ore shippers make El Paso their headquarters. From a mine 600 miles away, in Sonora, Mexico, $1,000,000 worth of ore was shipped in one year to this concern. It receives ores from New Mexico, Arizona, and West Texas and the Mexican states of Sonora, Chihuahua, Sinaloa, Durango, Coahuila and Lower California.

There are foundries and machine shops in El Paso that are employed almost entirely in the production of machinery and material for the mining and other industries of the region.

Wherever there is a region that is prolific in agriculture and at the same time is surrounded by a rich mineral producing section, there exists a combination, which, of itself, is certain to produce an important city. The mining towns need the products of the soil and the growers need the markets created by mines and the cash that is exchanged for farm products. The wholesale houses do their most extensive business with the mining settlements that are brought in close communication by the eight railroads. These railroads find their heaviest traffic in the carrying of ores, coal and supplies, including heavy machinery.

There will always be opportunity for the manufacture of lines of goods and articles for which the raw material can be procured cheaply. Cotton growing may become an important industry in the irrigated regions and the manufacture of cotton fabrics may be undertaken when the fuel problem is entirely solved.

Vast beds of coal and mountains of iron ore are yet to be developed in the vicinity of El Paso and these will bring extensive iron and steel works. Gold, silver, lead and copper are at present the chief mineral products. More smelting works and more manufacturing plants of various kinds will come with the development of the mineral resources of the region.

Railroad Brings Development.

Since that first railroad, searching out, as railroads have a habit of doing, a territory that promises remunerative business, stretched its steel length through this portal between the two Republics in 1881, the census and financial figures of the city's growth have served to draw many investors to it. The man with money to venture is prone to be impressed with bank statistics in growing communities. They are the book from whch he reads his lesson of investment. As a matter of fact the greatest portion of the city's advance has been in the last five years. Figures of two periods—ten years apart are given. In 1895 the aggregate capital of the banks was $155,000 and their deposits $856,054.95. In 1905 the capital was $750,000 and the deposits $4,886,181.15. In 1900 the schools had thirty teachers and 2071 pupils. The school property valuation was $70,000. In 1905 there were eighty-eight teachers and 4228 children and the property was valued at $371,000. Business property sold in 1900 at $400 a front foot. In 1905 it was worth $1000 a front foot.

To-day 40 per cent can be added with safety to everything that could have been said about El Paso's population, finances, resources, trade and property values in 1905. This, the Keystone City of the Southwest, as she is beginning to be known, grows rapidly. It is in such a place that investments increase rapidly, that the man who embarks in business or buys city realty swells his capital the fastest. El Paso is full of opportunities. Its business men say that no man ever came from another place that he wasn't impressed enough to remain or make some purchases of land and leave it to rise in value.

The El Paso Herald on February 12, 1906, contained the following figures concerning the financial condition of El Paso:

During the year 1905 deposits in El Paso national banks increased $1,658,000—from $3,870,000 to $5,528,000—40 per cent increase in a year.

During 1905 loans and discounts went up only 31 per cent, the increase being $816,000—from $2,588,000 to $3,405,000.

Cash items in 1905 increased 63 per cent, the amount of increase being $961,000—from $1,521,000 to $2,482,000.

The total resources of the four national banks increased 42 per cent during 1905, the amount of the increase being $2,031,000—from $4,805,000 to $6,836,000.

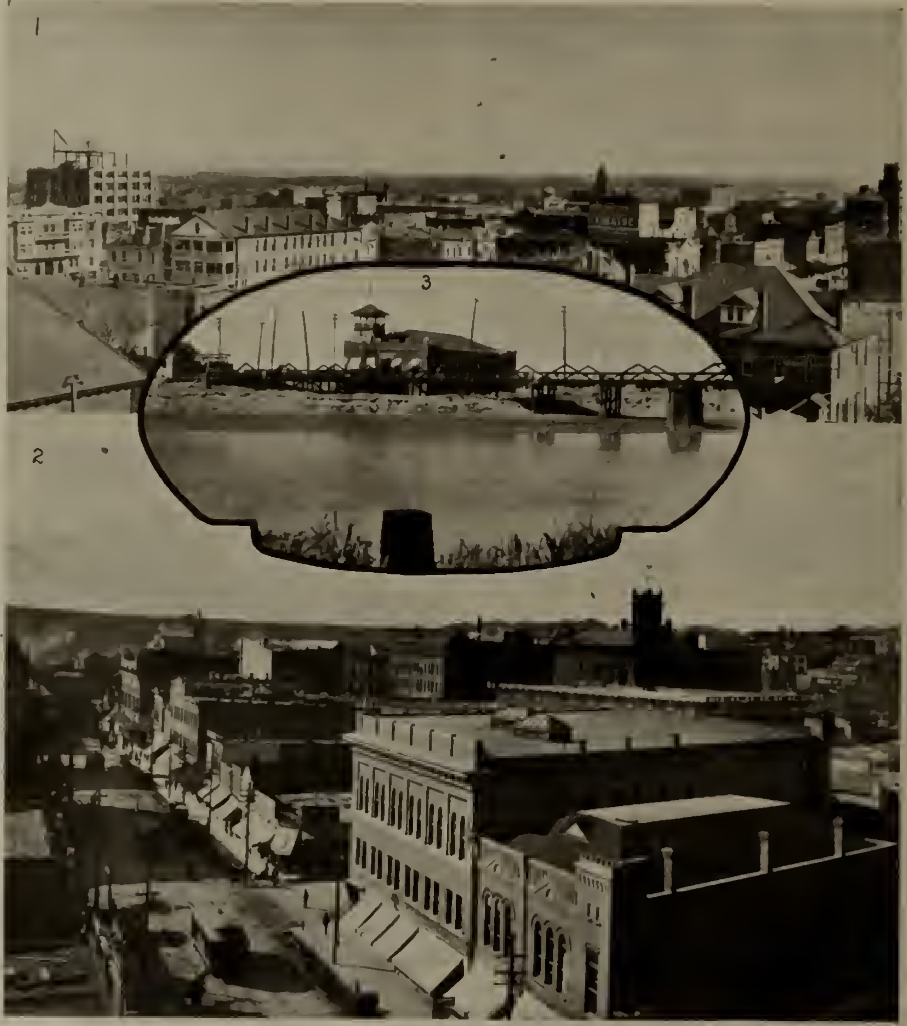
The showing in two months and twenty days since the November statement is even more striking than the annual comparisons.

In less than three months deposits increased by $511,000, or 10 per cent.

In three months loans and discounts increased only $28,000 over the November total of $3,377,000—less than 1 per cent increase in loans.

Cash items have increased since November by $356,000, or 17 per cent. Total resources were increased in less than three months by a round $500,000, or 8 per cent.

El Paso's finances are to-day on a sounder basis than ever. The banks are still a conservative force, and they had on January 29, 1906, $45 in cash for every $100 of deposit. The law requires only $15 for each $100.



1.---Partial view of El Paso, Texas, with New El Paso and Southwestern Railway office building to the left. 2.---Partial view of business district, El Paso, Texas. 3.---Bridge across the Rio Grande at El Paso, Texas.

First National Bank of El Paso

Is Sanitarium for the World.

As a world's sanitarium El Paso has issued a challenge to all other places on the globe that pretend to bring the invalid back to health. The climate of this border city is held to be a balm that builds up wasted systems. "A story of sunshine is an essential story to the medical man seeking climate suitable for his tubercular patient," says the El Paso Medical Society in prefacing data descriptive of that city's climatic conditions for the profession at large. Continuing, the members of the society say in a very artistic and convincing folder they have issued:

The majority of us, through tubercular disease existing in ourselves, or some members of our families, have selected El Paso as a point presenting the greatest number of features in eradicating phthisis in its various forms. Many of us have markedly improved since arriving here; others are to all intents and purposes, free from the original trouble previously existing in selves or loved ones. Feeling that such influences as have produced such results in members of our families or ourselves should be presented to the profession in a clear and concise manner, we beg to present 'The Story of Sunshine' to you, hoping that it may be and believing that its perusal will be of aid to you in selecting a climatic point for your tubercular patients.

El Paso is built on a sloping plateau, extending from the base of Mt. Franklin to the Rio Grande River. The altitude of the city is 3767 feet. The atmosphere is pure, dry and invigorating. The temperature of the locality is even and in the winter has a decided advantage over other places. Northers and cyclones, common to some parts of Texas, are unknown. Mines, railways, a border location, besides her previously mentioned chiefest charm, a healthful climate—have been the main stimuli in producing El Paso's rapid growth within a few years from a mere frontier village to a city of first importance. Churches we have here of every denomination; schools of the highest grades are in abundance. Amusements of various kinds are at hand. The quaintness of our neighbor, Mexico, the peculiar type of her national pastimes, are all readily witnessed and enjoyed by a visit to the sister city across the Rio Grande, Juarez.

Another feature that adds to the healthfulness of El Paso is her supply of the purest of water for domestic purposes. Every drop that runs through the pipes for human consumption is as healthful as that the boy on the farm quaffs from the cool spring gushing from under the rock. Good water has a wonderful effect on the health of any community and it is unfortunate that so many cities of America have such doubtful supplies. Here is what the Medical Society of El Paso has to say of the water of that city:

No one doubts that pure water in inexhaustible quantities exists upon the mesa, for through the efforts of a consolidated company the same is now being delivered through pipes and mains throughout the city. The analysis of the Highland Park, or mesa water, is as follows:

Parts per 100,000:

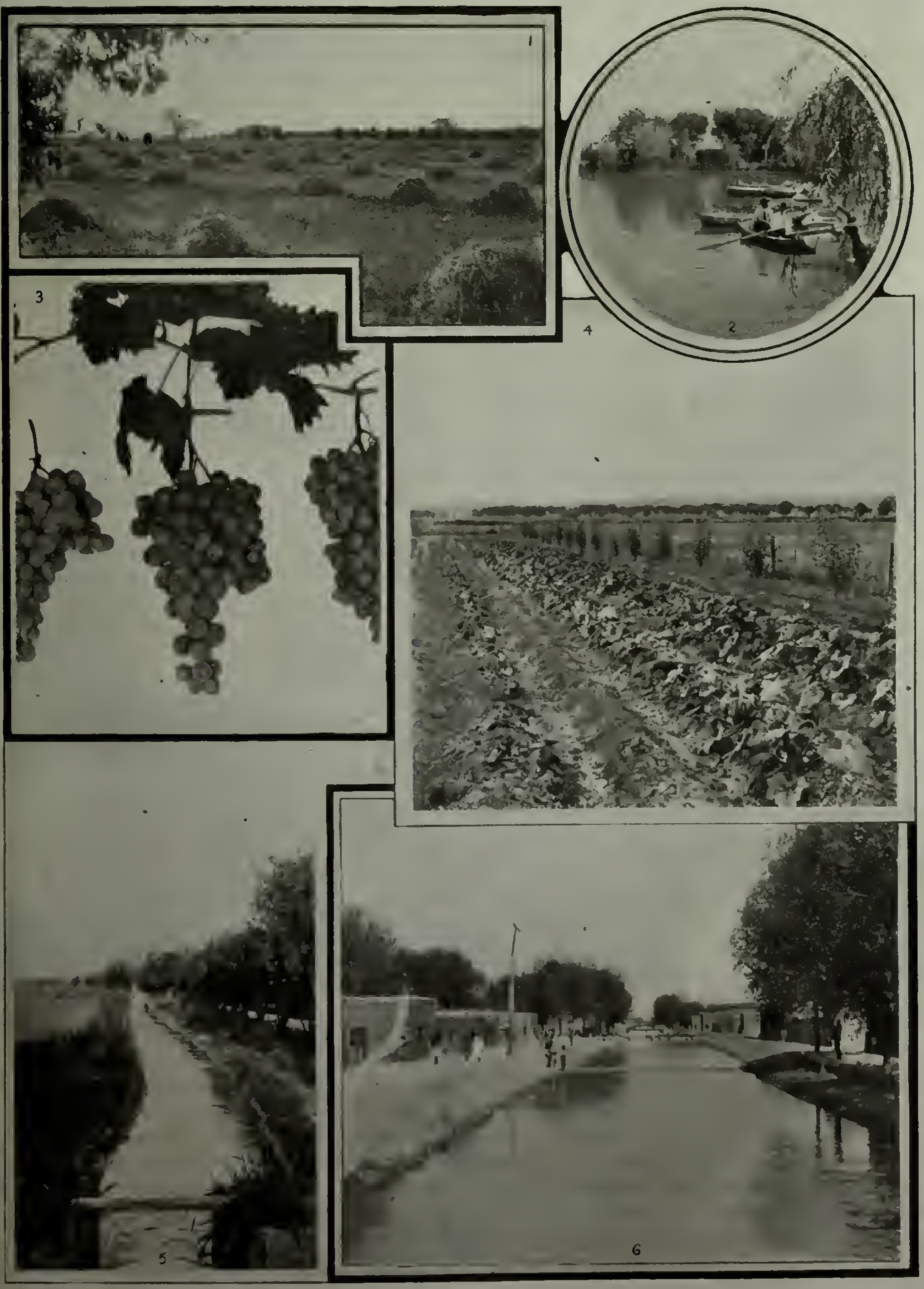
Silica,	3,00
Alumina and iron oxide	1.00
Calcium carbonate	12.00
Magnesium carbonate	9.85
Sodium sulphate	4.88
Sodium chloride	2.33
Water of crystallization, etc	0.95
Total solids	34.00
Hardness	23.75

El Paso's low relative humidity, its absence of extremes of heat and cold, its year-round pleasant climate, its low number of rainy, cloudy days, the small amount of rainfall, the electrical conditions, living expenses, moderate taxes, absence of northers, are the chief features that we presume will be of interest to you, the Medical Society continues in its folder for the members of the profession elsewhere. There are here the peculiar electrical conditions that Knopf, in recent literature, claims to be of vital import in the selection of a climate beneficial in tubercular troubles. We have here, in the main, an atmosphere charged with electricity to the point of seeming saturation.

There is no denying the fact that we have sandstorms two or three weeks during the spring; but such things are a necessity in any country with so little moisture and so much sunshine.

The altitude is a feature that we wish to lay special stress upon, believing as we do that 3767 feet is practically the happy medium between the low and the high altitudes that have been found beneficial in the treatment of tubercular troubles. Because of this medium altitude, there is less tendency to sleeplessness, hemorrhages, headaches, heat enervations, and vertigoes, that a patient is so prone to develop in extreme high altitudes. There are other points, higher, no doubt, that you have literature upon, that have at certain portions of the year an advantage over El Paso, but these summer advantages are neutralized by excessive cold in winter.

A temperature of 85 degrees in Chicago or New York is practically about 100 degrees in El Paso. There never exists a day during the summer time in El Paso during which a laborer, immaterial as to what his occupation may be, finds himself compelled to stop work on account of excessive heat. There is no record of a heat prostration at or near this place. This point, then, we feel to be of vital import, and one of the chief points of advantage that El Paso has in a climatic way—a location that can be utilized by a tubercular patient the year round. Besides this the absence of mosquitoes, or an excessive number of flies and pests, acts as an additional point of advantage.



1---Alfalfa Field near El Paso. 2---Lake at Washington Park, El Paso. 3---Sample of grapes grown in the Rio Grande Valley. 4---Field of rhubarb, J. A. Smith ranch, El Paso. 5---Acequia, irrigating ditch, El Paso. 6---Acequia, irrigating ditch, El Paso.

Prophecy of Von Humboldt.

The Secretary of the El Paso Chamber of Commerce, in writing of that city quoted Baron Von Humboldt, who wrote long ago, "Somewhere on the border of Old Mexico, in the United States, a great city will spring up." Continuing, the Secretary, who has recalled this prophecy, says:

El Paso is situated at the only point along the whole boundary line between the Gulf of Mexico and the Pacific where the natural conditions permit the building of a great city. At no other point is a concentration of railroads possible. No other point possesses one-tenth the natural resources of El Paso and the tributary country. The whole history of the Southwest since Onate crossed the Rio Grande at the "North Pass" proves this point has not, and can not have a rival for industrial and commercial supremacy in the great district of which it is the geographical center.

It was inevitable that transcontinental and local lines of railroad from all directions should come together at this place.

El Paso's growth and prosperity up to the present time and its promise of continued growth and prosperity rest upon the variety and extent of its resources and elements of strength. No city in the country is more richly endowed by nature. El Paso has incalculable and inexhaustible mineral wealth. It is surrounded by fertile lands that richly reward labor expended in agriculture and horticulture: Tributary to it are extensive tracts of valuable grazing lands. It is not far removed from immense forests of pine. It has vast deposits of excellent coal, within easy distance. It has a climate unexcelled in any part of the world and equaled in but few other localities. It has a position that makes it an important military strategic point. Its geographic position and the configuration of the surrounding country insure its future as one of the chief railroad and commercial centers of the United States.

As a place for investment in realty, whether business or residence property, El Paso offers uncommonly profitable openings. Notwithstanding the continued activity in building for the last five years, every desirable residence or business house is in quick demand as soon as completed or vacated. Desirable business and residence property has advanced in market value during the last three or four years from 50 to 200 per cent, and yields 10 to 18 per cent net, on the investment. Opportunities for investment in mining properties and manufacturing enterprises are unlimited.

Good judges say that the country about El Paso is today the best undeveloped mineral region left on the continent. Mining properties in all stages of development, from the shallow prospect, as yet only a chance, to the mine paying its hundreds of thousands of dollars in annual dividends, await the coming of the investor. The prospect can be purchased for a few hundred or a few thousand dollars, while for the best mines, where they are for sale, the price runs into the millions.

Is Fine Place to Live.

Skilled mechanics receive higher wages in El Paso than in the Eastern states. Like all growing places where money is more plentiful and wages greater than elsewhere, some articles are of higher price. This is a feature of all places where money is made the easiest. Yet living is as cheap as anywhere else on an average, and in many respects a great deal more comfort can be obtained with less money than in "cheaper" communities. The tourist and homeseeker will find everything favorable and delightful. Good furnished rooms may be had for from $10 to $15 a month and good board in private families costs from $3.50 to $7 a week. There is here as a gastronomic novelty and a delight to those who like it, the Mexican cooking. Many of the Mexican dishes become great favorites with the Americans. Here you can obtain a real tamale, that shows you that the "near-Mexican" article produced in many cities further away from the land of manana is far from the genuine in construction and flavor. A chicken cooked in the Spanish style is a dish that makes a feast. The homely tortilla and red bean are viands of relish under Mexican methods and many a "good feeder" does not disdain them at table.

For agricultural and other enterprises not requiring trained craftsmen El Paso has cheaper labor in her Mexican population, with a reserve supply ready to pour over the border when there is a demand for any unusual number of men. This is fairly intelligent and efficient unskilled labor and is available for manufacturing.

Men with money to install plants can find large profits now in canneries for meat, fruits and vegetables, factories for the production of leather goods, especially boots and shoes; a cracker factory, beet sugar mill, factory for furniture and other household goods, cotton and woolen mills and numerous other industries. An important industry to the commerce of the city is already under way, the Southwestern Portland Cement Co., incorporated for $2,200,000, is now under construction. They have acquired the Courcheme cement tract, 900 acres in extent, and will have a capacity of 1400 barrels per day, employing 150 men, and with the latest and most improved cement machinery. A new brick plant making the sand-lime brick, with a capacity of 50,000 per day, has also recently been completed and is now in operation.

One of the leading car wheel manufacturers is also figuring on establishing a branch here.

So great is the tide of traffic that pours from Mexico through El Paso that it is the eleventh city of entry for imports in the United States. A heavy tide of goods passes in both directions through the customs houses of El Paso and Juarez. Among the chief articles of import are ores and bullion, cattle, hides, tropical fruits and other Mexican products. The leading exports are manufactured goods, machinery leading. The growth of the trade is extending the variety of goods exchanged each year.

As El Paso is the metropolis of all the great section that it draws from, extending for a radius of nearly 1000 miles around it, the men of wealth and enterprise all over that section make it their home or headquarters. Cattlemen and mining men especially, and wealthy farmers, build fine residences in this city and establish their families there to reap the social and educational benefits and the conveniences and pleasures of city life. There are all the usual amusements found in a progressive place that has taken its position among the important cities of a nation, including the theater and the opera. There are fine hotels in El Paso and elegantly equipped men's clubs. The usual pastimes of tennis, golf, automobiling and driving are engaged in. Then there is the carnival, and at Juarez, the bull fights.

Beautiful Public Buildings.

El Paso has beautiful public buildings that at once give the visitor a good impression of the city and its residents. The Federal building there is a handsome edifice. There are magnificent fitted stores and banks and luxuriously appointed hotels. In fact all the finish and style found in much larger cities nearer centers of population characterize El Paso. There are quaint old samples of Spanish architecture and old time gardens that please the eye. It was her standing as a port of entry that gave El Paso such a fine government building so early in her new career. All the public school buildings are handsome edifices and the new high school structure is very pretentious, being one of the prettiest to be found anywhere.

El Paso is not a frame city, but is substantially constructed of brick, with stone used as trimmings. There is plenty of lumber within 100 miles of the

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1---Union Station at El Paso, Texas, cost $400,000. 2---Partial view of residence district El Paso, Texas, with Mt. Franklin in background. 3---Federal Building at El Paso. 4---Public Library Building at El Paso, Texas. 5---Y. M. C. A. Building El Paso, Texas. 6---El Paso county Court House, El Paso, Texas. 7---Elks Club House El Paso, Texas. 8---City Hall El Paso, Texas.

city and large lumber yards in El Paso, but brick seems to be the material that the climatic conditions make the most desirable. Hand or machine made brick cost only $7.00 delivered and pressed brick $9.50 and upward per thousand. Common pine lumber retails for from $25 to $30 a thousand and finishing lumber for $40. There are several banks of first quality clay near the city and several plants turn out millions of bricks annually. Local demand keeps up with the products of these plants, though there is a market for the brick in other growing towns.

The reasonable price of the more important building materials has had much to do with the rapid growth of El Paso. It is estimated that 50 per cent of the people there own their own homes, which shows a gratifying degree of prosperity, considering the fact that only 10 per cent of the people of Eastern cities are as fortunate. The homes of the El Paso people are handsomely finished on the interior and surrounded with pretty grounds, containing semi-tropic foliage.

Some of the leading fraternal orders have handsome buildings, the Masonic Temple being an especially pretentious lodge structure. There are also handsome sanitariums.

Old Mexico Lends Its Charm.

The contrast presented by the old Mexican city of Juarez, across the river, still old, because it has not been born again, is striking. The Mexican city has acquired modern buildings, but the adobe still predominates overwhelmingly and the narrow streets are lined with those squat structures, the doors opening directly onto the streets and the windows laced with iron bars. But there is the old Mission church—centuries old—standing on the brow of a hill and adding picturesqueness to the scene. The custom house and the jail rise to greater heights than the average adobe, too, but there is not much to take away the old time Mexican aspect. Juarez is a foil for the more modern El Paso and is as necessary to it as a museum to a fair. In this quaint place across the river, with the hand of century-dead builders upon it, the tourist in the American city finds delight and the American city need lose no prestige in its general new appearance by having this sight of the old for the visitor. Then there are the famous bull fights, which would be prohibited in American territory, but which El Paso can advertise almost as her own device for the amusement of her guests. There are the Mexican shops and the picturesque Indians, and the Mexicans themselves in the old city over the Rio Grande, the pretty senoritas in their mantillas and the soft voice of the guitar in the cool evenings within the patios.

For a long time the patient mule dragged the few street cars that El Paso had, but the grand awakening blew the mule clear off the track as if a charge of dynamite had been set off under him. Four years ago one of the finest electric trolley systems in America, covering the whole city was installed. It brought a great wave of activity with it and the mule shed tears as he gazed and realized how very little of a potentiality he was in the building of modern cities. Suburban residence tracts have opened up under the impetus of the rapid transit and many handsome villa homes are coming into existence.

Of course there are plenty of churches in El Paso. The zealous religious element is always at the front in the building up of prosperous communities and Christianity has not been behind with its excellent work in this city. The houses of worship are elegant and many and give El Paso foremost rank as a Christian community.

There are the best of fire and police protection, without which no city could be modern or a desirable place of residence. Built of brick, though, there is little danger of El Paso ever suffering the ravages of a conflagration.

Fort Bliss, where the government has quarters for eight regiments, is five miles northeast of El Paso.

Enchanting Resort In Mountains.

And then there is the heaven-reaching summer resort, Cloudcroft. It is in the Sacramento Mountains, at an elevation of 9000 feet and 112 miles northeast of El Paso. You go there by train, the last section of the ride being over a wonderfully constructed mountain railway from Alamogordo, away up at the head of the valley, beyond Rincon and Las Cruces. It is cool and delightful up there during the hottest months. The scenery along the route is picturesque and grand. The mountains are covered with a dense growth of pine, spruce and other timber and there are ferns and wild grasses and cold water that cascades down the mountain sides. People throughout the whole Rio Grande valley go there for the camping season. There are hotel accommodations at Cloudcroft. This resort is nicknamed the "Roof Garden of the Southwest."

From the Sacramento Mountains may be seen that wonder of nature, the granulated gypsum desert, covering 250 square miles between the Sacramento and the San Andreas Mountains—a dazzling white waste with dunes and hills, giving the appearance of sea surf.

El Paso County covers 9750 square miles or 6,240,000 acres, being larger than the State of Massachusetts. It has a frontage of 147 miles on the Rio Grande. This area contains mountains, valleys, plains and table lands, or mesas. The soil is equally diversified, ranging from the barren, rocky mountains, gravel and sandy plains to the rich alluvial lands of the Rio Grande Valley, where, in the midst of all the surrounding waste, lie fertile farms for so many. In topography, soil, climate and natural resources, El Paso County must be ranked with New Mexico, rather than with Eastern Texas.

The lands contiguous to El Paso that the water from the Elephant Butte project will cover are similar in fertility and products to those of the Mesilla Valley about Rincon and Las Cruces. In fact all of the territory covered by the Elephant Butte project is within the natural trade domain of El Paso, the metropolis of the region. Unimproved agricultural lands in the Rio Grande Valley immediately above El Paso, which section is known as the El Paso Valley, and beyond the city to Fort Quitman, where the project ends, may be bought for from $10 to $25 per acre and improved lands for from $20 to $100 per acre, except where planted to orchards and vineyards. The returns will be equal to those of the Mesilla Valley. The farmers need not wait for the coming of the water from the government system. Water is already obtained through canals from the Rio Grande and by pumping. An eight-horsepower gasoline engine and pump will irrigate from forty to sixty acres of orchard and vineyard.

The New Mexican Agricultural College and Government Experiment Station, so useful to the Mesilla Valley farmers, are only forty miles above El Paso and the benefits of its experiments are also within the reach of the growers about the Texan city. The college bulletins containing the results of the scientific experiments, that search out the quickest way to wealth for the farmer, are mailed free.

Small Farm Brings Independence.

The man who is putting up with the discomforts and hardships and perhaps meager existence of a colder clime should look into the opportunity that lies in the Rio Grande Valley. If from forty acres of land he can raise crops that will give him ownership of that land and a free water right in a few years, besides money in bank and a good living all that time for a large family, it looks as if it would certainly be well for him to remove to this "land of sunshine," join in its advance and partake of its prosperity. It is something to feel the full glow of health that the outdoors and an equable climate bring and something more still to acquire a competency in a pleasant land where the toil necessary to acquire it does not bring age before it can be enjoyed. The people of El Paso ask that you at least investigate and then decide for yourself. They say they do not fear the result of a most thorough investigation, being in this respect like the other places that feel they have good home opportunities to offer.

The soil of what is known as the "Lower Valley," lying directly below El Paso, is a black sandy loam, going down from five to twenty feet. Under this is a stratum of sand, ten to fifteen feet in depth, then a gravel formation. Through this gravel flows an inexhaustible stream of pure water. It is this that is pumped upon the lands where ditches have not been dug.

It is probable that only one-half of this rich region has been brought under cultivation. There are farms to be had by those who will come for them.

Grape growing has proved a success in the lower valley. The soil has been found to be of the best for varieties of grapes that produce fine wines. The yield is prolific and the flavor as true as the wines of France. The making of wine will some day be a great industry in this valley.

There is little use going through the long list of products that the rich lands of this valley will grow in prodigal profusion with water and cultivation. Heavily producing farms so close to a growing city are always money makers.

What the El Paso people want you to remember is that there is land for you and that your prosperity and that of the city are linked. Lands that you secure for from $10 to $20 an acre are worth from $50 to $150 after ordinary improvement and watering. There is no difference in the productiveness of the land. It is all a matter of location.

Many Letters of Inquiry.

Thousands of letters of inquiry about these lands and the city of El Paso are coming in daily. It is the desire to give the fullest information, and all questions are answered.

El Paso in Texas, and Rincon and Las Cruces in New Mexico maintain active Chambers of Commerce and inquiries made of any of these chambers will receive prompt reply.

The officers of the board of governors of the El Paso Water Users' Association, formed in compliance with the government regulations, are A. Courchesne, president; J. W. Magoffin, vice president; Felix Martinez, chairman executive committee, and G. W. Huffman, treasurer. Other members of the board are J. A. Smith, H. B. Stevens,

C. O. Coffin, Z. T. White, Royal Jackman, D. E. Doane and G. N. Garcia.

Intending settlers under the Elephant Butte project throughout the Rio Grande Valley should read the story of the Nile Delta. The same fertility that exists in the valley of this great river exists in the valley of the Rio Grande. This river that rises in the snow fields of the Rockies and gathers up enriching particles on all its long whirl to the home lands of New Mexico, Texas and Mexico, fertilizes those lands every year so that they are kept in the highest state of production without expense to the farmers. The benevolent river not only gives its waters to the land, but spreads over them the necessary plant food as well.

There is no farmer now in the Rio Grande Valley who would return to the place he left to go there, no matter that that place might be deemed one also favored by nature. They all say that the Rio Grande region is the best they have found. The contentment of those already on the ground is an earnest for others of the advantages to be gained there, the people of the valley say.

Some Sample Farming Results.

Among the persons that have been successful in the lower valley is J. J. Smith, who has made a speciality of grape growing. His hopes were high when he went there, but he says they have been surpassed. He has made a great deal of money off Flame Tokays, Muscat, Morocco, Malaga and the Mission grape. The yield often exceeds thirty and forty pounds to the vine. Prices are always good.

C. O. Coffin has irrigated 350 acres with ditch and pump, finding the latter method of irrigation entirely feasible. He has forty acres of Bartlett pears and also raises large crops of the Duchess and Winter Nellis varieties. He raises splendid cantaloupes. The glory of the Rocky Fords must be again accentuated by making comparison. Those raised on the Coffin place are in every way equal and their producer claims, superior to them.

George Pendell has 200 acres under cultivation and places in the market at various times during the year, tomatoes, onions, melons and fruits of all kinds, all of the finest quality.

J. A. Smith, starting with a small tract of alfalfa in 1894, is today at the head of the largest dairy operated under one management in the United States. Milk is supplied to the city of El Paso two hours after being taken from the cows. This dairy company furnishes one of the best examples of what may be done from a small beginning with thrift and industry.

It is presumed that any of the gentlemen mentioned will tell you about their success and how they accomplished what they have. If they can reap success in the Rio Grande region, others of intelligence and energy can. Many of the richest and most prosperous residents of El Paso got their start or derived all their wealth from small watered farms, coupled with wise investments in the growing city. The money you save, if put into El Paso realty, is sure to bring you at least treble in a few years.

There is one thing in particular that the business men of El Paso, in setting forth the advantages of their fair region, wish to impress on those who are looking toward this fruitful land as a place for homes: The person who goes there is not going to an uncivilized locality where all is crude and society but half developed. No matter what place the newcomer to this region leaves, he will find in the El Paso Valley and in the city that bears that name social conditions, progress, comforts and civilization equal to any he has been used to, no matter that his life has been lived in the oldest settled community in New England. There will be one difference: He will find that there is a greater crispness, freshness, vigor and activity predominant among the people and in affairs in the Western region.

Members of the Executive Committee and Board of Governors of the El Paso Valley Water Users' Association: 1.—Z. T. White, member Board of Governors. 2—Felix Martinez, Chairman Executive Committee in charge of the El Paso Valley Water Users' Association. 3.—A. Courchesne, President Board of Governors. 4.—H. B. Stevens, member Executive Committee. 5.—B. M. Hall, formerly Supervising Engineer Rio Grande Project, now a consulting engineer. 6.—J. A. Smith, member Executive Committee.

Some Swamp-Land Figures.

The following press dispatch concerning swamp land reclamation that has been sent from Washington is of interest, as it sets forth some of the wonderful possibilities of this work:

If present plans for reclaiming swamp lands go through, areas which will be added to the production of the nation will be: Arkansas, 9230 square miles, or 5,907,000 acres; Missouri, 3810 square miles, or 2,438,500 acres; Louisiana, 15,930 square miles or 10,195,200 acres; Mississippi, 9000 square miles, or 5,760,000 acres and in other Southern States from 690 square miles in Kentucky to 30,930 square miles in Florida.

Several Northern States also will profit by the drainage projects, although the swamp lands lie mostly in the South. The total area to be reclaimed is 119,972 square miles, or 66,782,080 acres. This equals the combined areas of Illinois, Indiana and Ohio.

Were the immigrants arriving annually to go on farms of twenty acres for each man, woman and child, the entire area of proposed swamp land reclamation would last only about three years, because people are coming at the rate of 1,000,000 a year.

Another feature of this problem is the cheapness with which swamp lands may be reclaimed. It costs from $20 to $60 an acre to place arid lands under water for irrigation. Some of the drainage projects which undoubtedly will be undertaken will cost not more than $5 to $10 an acre.

Every time a farmer sells a ton of wheat he sells $11.62 in fertility; in a ton of clover he sells $8.62 in fertility; in a ton of alfalfa hay he sells $8.63 in fertility; in a ton of oats he sells $7.81 in fertility, and in a ton of corn he sells $6.47 in fertility. If these products be fed on the farm under proper conditions, and the resulting manure be returned to the soil, there is a very slight loss in fertility, for the following products may be sold instead:

In selling a ton of finished beef on the hoof the farmer sells but $5.37 in fertility; in a ton of live hogs he sells but $3.70 in fertility; in a ton of milk he sells but $1.48 in fertility; in a ton of cheese he sells but 69 cents in fertility, and in a ton of butter he sells 27 cents in fertility. The best policy for the farmer to adopt is that system of corn and crop rotation which will embrace not only the growing of grain, but the breeding and feeding of stock, either for sale in the form of beef or pork, or for the production, whether for milk, cheese or butter.—Prof. Holden.

Handicap on Child of Street.

In the race of life, in the contest of physical endurance, in the moral tests that come, that child has not a fair chance who has sprung out of the mud of the streets.

To know the breath of the lilacs and the rustle of autumn leaves, to be up with the lark, to bathe one's feet in the dew of the pasture, to go to bed with the song of the whippoor-will—these memories are like guardian angels.

The children whose horizon is a brick wall, who must play on the cobblestones and go swimming in the canal and be chased by the police, if they do not grow up to be ideal citizens, shall we of holier memories sit in judgment on them? Shall we not remember their bonds?—The Modern World.

North Dakota Project

Extraordinary Pumping System on Missouri

MAMMOTH CENTRIFUGAL PUMPS FOR WILLISTON DISTRICT PROJECTS LOCATED ON BARGES AND LIGNITE COAL FROM GOVERNMENT MINES GENERATE ELECTRICAL POWER FOR THEM.

JUNE, 29, 1907, will go down in her history as a red-letter day in the development of the State of North Dakota, and especially the northwestern section thereof. On that day Honorable James Rudolph Garfield, Secretary of the Interior, accompanied by Dr. F. H. Newell, Director of the Reclamation Service; A. P. Davis, Chief Engineer; Mr. H. M. Savage, Construction Engineer, and others of the Reclamation Service, arrived at Buford and Williston, Williams county, to inspect and formally open the Buford-Trenton and the Williston Irrigation projects, which have been constructed by the United States Government through the Reclamation Service. Although it was not possible to actually turn the water on to the fields at that time, a most thorough inspection of the main power plant, sub-pumping stations, floating barge, settling vat and the main and lateral canals was made and with fitting ceremonies the projects were formally declared opened. U. S. Senators H. C. Hansbrough and P. J. McCumber, Congressmen Thos. H. Marshall and A. J. Gronna, Lieut. Governor Lewis, State Engineer A. L. Fellows, many of the State Senators and Representatives, as well as several hundred prominent citizens of the State, were present and the occasion was made a gala day at Williston.

An inspection of the Williston Project brought out its many as yet untold possibilities for developing the lands under the ditches and it soon became apparent that the State of North Dakota is possessed of an asset of inestimable value in its share of something like $4,500,000 Reclamation fund.

North Dakota is proud of the fact that it is the home of Senator Hansbrough, who fathered the Reclamation Act in the upper house of Congress.

Pumps will ride River on Big Scows.

Floating pumping stations that will ride the Missouri River and suck up its water for use on the lands of bench and valley above that are to be irrigated, will be a unique and extraordinary feature of the Buford-Trenton, Williston and Nesson projects. They are virtually one and their features are virtually the same. Here the government will use as fuel lignite coal taken from its own mines near the central power plant. The projects are located in what is called the Williston District in North Dakota.

The water is to be pumped from the Missouri, which is an unruly stream at its flood. The pumping stations must be close to the water to do their work properly. If they were built on land near the bank of the Missouri, that stream might in time, by cutting a new channel, leave them far away from its flow. If this did not happen, the stations would be in danger of being undermined by the current and toppling into the stream. The problem was solved by the government engineers by designing floating stations. These are large scows or barges compactly built, on which centrifugal pumps, driven by induction motors, are mounted.

These stations are to be hauled out and cast in again as a fisherman operates his nets, only he goes after fish and the Reclamation Service after water. There are ice jams in the Spring that would crush the scows and pumps if they were left in the river. It is necessary that they be drawn out onto the bank each Fall and launch them again in the Spring, after the ice is gone. This is at the beginning of the irrigation season. As no water is needed on the lands in the winter the "bleaching" of these pump house-boats will not interfere with the work of the farmer.

Government Opens big Lignite Coal Deposit.

To make these pumping operations successful, it was necessary that the government have a fuel supply near the central electric power-house, on shore, that the cost of fuel might not make the scheme impracticable. The total cost of mining the coal and delivering it under the boilers is $1.25 a ton, allowing for maintenance of mining plant and tramway.

It is more satisfactory to use electric power transmission in the pumping work, as, while the intake pumping stations will be located in the river, others are to be put where the water must be lifted from a low line to a high line canal, and will be in places to which fuel for generating steam could be taken only at great expense.

A fine description of the principal works of the Williston District projects, which are attracting the attention of electrical engineers throughout the world, has been prepared by E. R. Brownson, secretary of the Williston Water Users' Association. At the point of vantage, three miles north of Williston and but a few hundred yards from the splendid coal deposit, has been built the massive main power plant, or Station No. 1, where is generated 1,500 horsepower. It is a fine example of the strength and permanency with which the government is constructing all its irrigation works.

Extensive in its proportions and massive in its construction, there is no similar plant to be found in the world and that it will serve as a model for many more, both for private and governmental use, is assured. Built of solid cement and concrete, 90x70 feet, with walls from 36 to 16 inches through, and 20 feet high, it is practically as solid and substantial as the pyramids themselves.

Following up a most thorough and systematic investigation, to ascertain the possibilities of this lignite coal, in which a series of practical tests were carried out in Denver beet sugar factories and several eastern power plants, a new system of boiler battery has been evolved and installed at this power plant, which, by combining the steam and gas producer, will extract the full worth of the coal. Additional experiments have resulted in the construction of an ingenious form of grate specially adapted to the use of lignite coal and from its use much good is expected. These tests and experiments have been carried on under the personal supervision of H. A. Storrs, Electrical Engineer in charge of the Williston Project.

Lifting Water to the High Benches.

Six boilers, with a capacity of 1,500 horsepower are already installed at the plant and two Steam Turbine Pumping Units, with a capacity of 20 cubic feet per second, are employed in the pumping work from the main canal to the high-line canal of 60 feet. Two Steam Turbine Electric Generators, with a capacity of 300 kilowatts, generate a voltage of 2,200 volts. Three enormous stacks 52 inches in diameter and 160 feet above the base will create a force draft sufficient to produce the best results in burning lignite, which requires an exceptionally strong draft. To hold these stacks in place sixteen cable guys are used and each guy is anchored to a concrete tube 6x6 feet, imbedded in the earth.

Fourteen hundred feet from the power plant is the opening of the coal mine and 150 tons of coal will daily be transported over an electrically operated road, to keep the plant going. As it will serve as a model of its kind, so will the coal mine be studied and watched by many who planned the opening and development of similar properties throughout the State.

To date the main mine entries have been driven some 300 feet through the clay cut leading to the coal vein which is 9½ feet thick..

From the main power plant electricity will be carried over the transmission lines with a voltage of 22,000 volts, to the floating barge pumping plant, Station No. 3, located at the river bank three miles south. Three pumping units with a capacity of 30 cubic feet per second, driven by 150 horsepower motors, will here pump water from the Missouri River, carrying it through flexible pipes to the settling vat 125x300 feet in dimension and 20 feet deep, where the river sediment will be allowed to settle before the water is turned into the main canal. From the settling basin to the mouth of the main canal, 300 feet north, the water is conveyed under the Great Northern Railway tracks through a concrete syphon. The main canal, 25 feet wide and 8 feet deep, runs in a northerly direction three miles to the main power plant. One mile north of the settling vat, on the main canal, is located Station No. 2, containing two pumping units of 20 cubic feet per second capacity. Water is here lifted from the main canal to a high-line canal, 30 feet 100 horsepower motors doing the work. Station No. 4 is located three-quarters of a mile west of Station No. 2, and one mile north of Williston. It contains one pumping unit of 20 cubic feet per second pumping capacity and lifts the water again to another high-line canal 27 feet, the power being transmitted, as for all other stations, from the main power plant.

The operation of the pumps at the stations will be so automatic and reliable that a minimum of attendance upon them will be necessary. Virtually all the labor necessary for operating the system will thus be concentrated at the main generating station.

Shifting Channel must be Considered.

In showing how rapidly the river bank at this place might recede, the government engineers state that at the Mondak Landing, near Buford, the bank was cut back by high water nearly 150 feet during a few days of the June rise of 1906, and opposite Williston the bank has been cut back more than 500 feet in sixteen years. On the other hand, a bar now forming opposite Williston, is already an island of several acres extent at low water, and in a few year the channel nearest the Williston bank may have silted up, thus forcing the water into the other channel and bringing about a change of half a mile in location of the left bank of the river at the present site of the Williston intake pumping plant.

The Missouri River rises regularly in June, just at the time its water is most needed for irrigation. The rise is not caused by rains, but by the melting of snows in the distant mountains. The rise comes at a fortunate time, not because the water is needed, but because it elevates the intake pumps and gives them the least lift at the time when the most work is required of them. The Missouri carries just enough silt at high water to need consideration. To prevent this being pumped out into the canals, a settling basin will be provided at each pumping station in order to reduce the amount to such a small percentage before it flows away for irrigation that the waterways will not be impeded. The sediment in the settling basins, which will really have a density little greater than clear water, will be disposed of by an electrically operated suction dredge that will discharge it into a sluiceway leading to the river.

The irrigation season here is expected to extend from May 15 to September 15. There will probably be about two acre feet of water furnished the settlers on the 37,500 acres of bench, bottom and valley lands that are to be served through this pumping project.

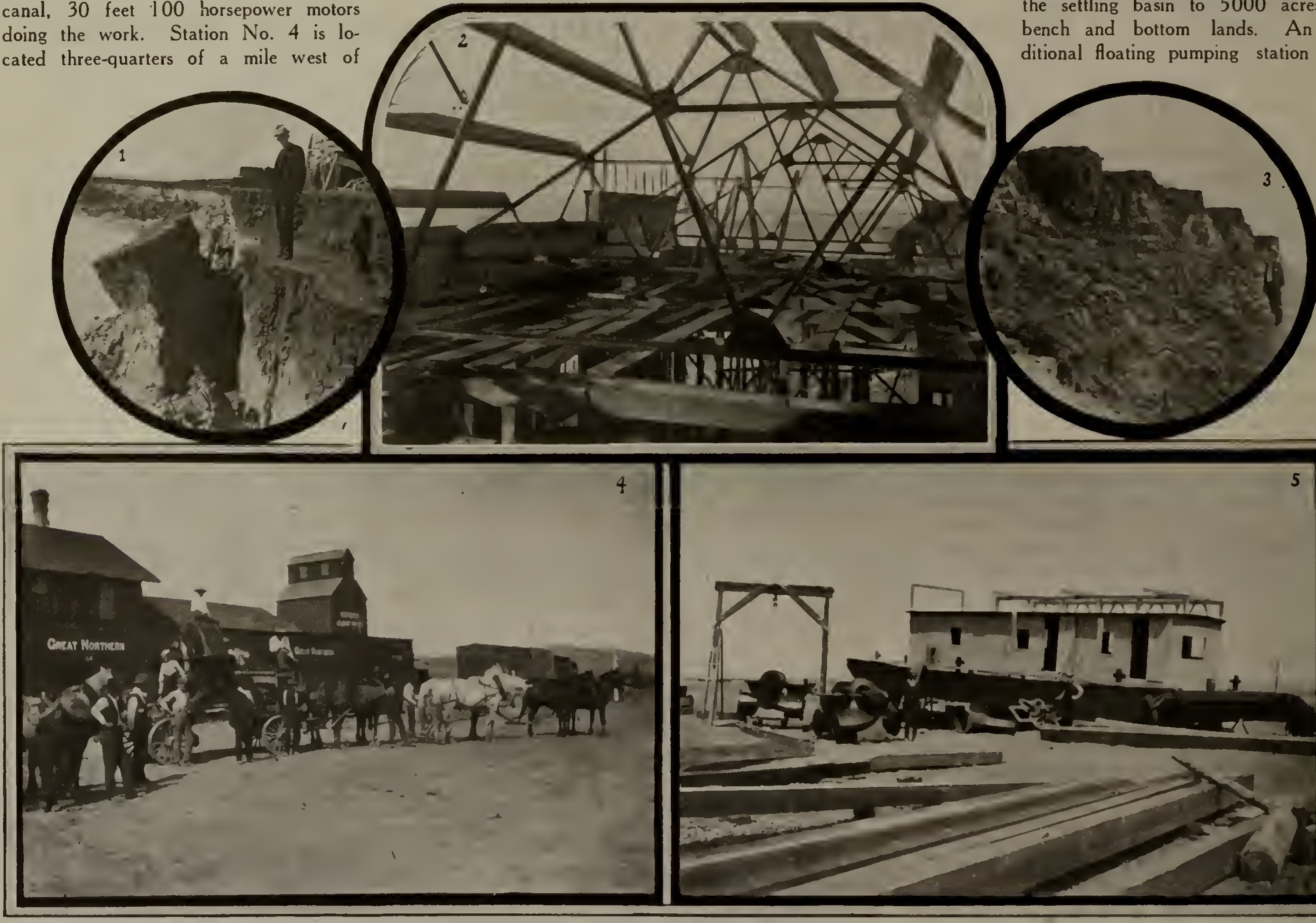
Great Pumps on the Buford-Trenton Project.

The Buford-Trenton project will have its main intake pumping station on the left bank of the Missouri, about two miles below the mouth of the Yellowstone, and one mile from Buford Station on the Great Northern Railway. Six hundred feet from the river will be installed pumps to take the water from the settling basin and force it through about half a mile of steel concrete pipe to the head of the first canal, which will carry water to about 6,000 acres of cleared bench land. The pumping lift from the lowest level of the river will be about 85 feet. A lower canal will carry water directly from the settling basin to 5000 acres of bench and bottom lands. An additional floating pumping station will be installed adjacent to the Trenton flat. It will irrigate about 2,500 acres, with a lift of twenty-seven feet. Power for the Buford-Trenton Project will be transmitted twenty-five miles from the main power station.

Main Intake Station Near Williston

The main intake pumping station of the Williston project will be located on the left bank of the Missouri, about 1,000 feet from Williston station, on the Great Northern Railroad. A main canal will furnish water directly to 500 acres of cleared land, and will supply three upland pumping stations with the water they will raise to the higher canal lines, covering 6,500 acres of cleared bench lands. Two other pumps will supply 2,000 acres of bottom land.

The Nesson Project will have its principal pumping plant on the left bank of the Missouri, near Nesson Postoffice, about twenty-five miles



1---Showing cave of Missouri river bank at Steamboat Landing, due to drying out of soil, Williston. 2---Trusses over generating and pumping room of station, near Williston. 3---Low water in Missouri, showing erosion of bank, near site of Williston pumping station. 4---One of the large centrifugal pumps for the Buford-Trenton Irrigation Project being hauled from the station to the works, which are one mile south of Buford. 5---Floating barge pumping station, Williston, N. D.

by wagon road from Williston and fourteen miles from Wheelock on the Great Northern Railway. The scope of this scheme had to be lessened because the landowners along Beaver Creek, who had obtained rights in its waters, refused to subscribe their holdings. There are now about 12,000 acres in the original project. Of this about 1,200 acres are government land. To this will be added 5,000 acres on the right side of the river, 3,000 of which are government.

Farmers under the Williston District Projects have had little experience with irrigation and for this reason the government has deemed it wise to limit its opening operations. Higher bench lands may be taken in later—whenever it has been demonstrated that they are able to stand the expense involved.

Work on the projects is well under way and it is expected that on one of them, at least, the Buford-Trenton will be completed this December and the water turned on next April.

Until the last three or four years the Williston region has been deemed fit only for grazing and few persons settled upon it. There is now, though, but a small percentage of government lands. Few of the settlers, however, have proved up on their holdings.

Bench lands predominate under this project. The soil ranges from a sandy gumbo on the lower benches to a sandy loam on the upper benches. There is little alkali and that in spots. The natural drainage is good in all the projects. On the low benches toward the river, there is much brush and some timber. On the upper benches and up Little Muddy Creek Valley the land has no timber or brush and is heavily grassed where not farmed.

The average yearly rainfall in the district is from 13 to 16 inches, but this is not properly distributed and crops are often failures.

The farm unit here will be from 40 to 80 acres and water rights will cost from $25 to $30 an acre. Excess land is held at from $10 to $30 an acre.

Sacramento Drainage Act Valid.

The decision rendered recently by Superior Judge Nicol of Tuolumne County, sitting for Judge Hughes of Sacramento, sustaining the Sacramento Basin Drainage Act has greatly elated the California River Improvement and Drainage Association and made the way clear for the landowners in the overflowed sections of the valley to co-operate with the Federal Government in the work of reclamation along the Sacramento. In 1904 allied commercial bodies met in San Francisco and appointed a general committee of twenty-five to frame a proper act under which the work could be carried on. This committee, after hearing the report of a commission of engineers appointed by it, submitted to the Legislature a bill establishing the Sacramento Drainage District and providing for a board of drainage commissioners with power to carry out its provisions by compelling the doing of such work as might be deemed necessary and levying assessments to meet the expense. The commission of engineers appointed by the committee consisted of Major T. G. Dabney of Mississippi, Henry B. Richardson of Louisiana, Major H. M. Chittenden of Iowa and M. A. Nurse, State engineer.

Speaker Cannon's Service Record.

Speaker Cannon was born in North Carolina May 7, 1836, and is 71 years old. It is interesting to note that if Mr. Cannon lives to the end of his present term he will have served thirty-four years and thereby established a new record for the longest service in Congress. The longest service is that of the late John H. Ketchum of New York, who served thirty-three years and was a member when he died. Of the Congressmen that have served since the foundation of the government, more that 12,000 individuals, only thirty-four have served twenty years or more.

A Wonderful Lake.

Trinidad Asphalt Lake down in the British West Indies is one of the most remarkable and interesting formations ever wrought by Dame Nature. It is called the Eighth Wonder of the World.

The bed of the lake is evidently the crater of an extinct volcano—a huge bowl-shaped depression about half a mile in diameter.

Instead of being filled with water this natural receptacle contains a mass of black viscous material—natural asphalt.

Probably the first questions you are likely to ask are: How did it get there? Where does it come from?

This lake is fed like many lakes of water, by subterranean springs, but these springs instead of giving forth water are the media through which the asphalt comes up from the interior of the earth, whose "internal workings" are responsible for the production of this peculiar material which has proven so useful to civilization.

The Barber Asphalt Paving Company, Philadelphia, was among the first to recognize the immense commercial value of asphalt and after making repeated tests of this material were so impressed with the quality of asphalt yielded by Trinidad Lake that they secured control of its output, and have been bringing this product to the United States for many years and adapting it to the use of modern civilization.

One of the most important uses to which they have put it, is to make a waterproof roofing that defies the storms, heat, cold, and every other weather condition. This is called Genasco Ready Roofing. It doesn't leak, and thus has the advantage over shingles, which warp and rot; tin, which pits and rusts; and the coal-tar roofings which crack and go to pieces.

Genasco is adapted for every building on the farm, from your own residence down to the chickenhouse—and if you cover the chickenhouse all over with Genasco it keeps it mighty warm in winter.

Any handy man about the farm can lay Genasco Ready Roofing. This saves the expense of an experienced roofer and gives lasting protection, so that there is considerable saving every way.

Valuable information on this subject is incorporated in Book 23, issued by the Barber Asphalt Paving Company, Philadelphia. They will send this book gratuitously to anyone who writes for it.

This modern asphalt product is welcomed by progressive farmers everywhere, and has already become quite popular on account of its economy and durability.

Onions as Germ Killers.

Not long ago a Scotch teacher gave this advice to her pupils, says Health: "If you have cholera or scarlet fever in the house put some onions under the bed and they will sweep away all disease." The onion proved its virtue in a remarkable way forty years ago, when cholera raged throughout London. It was noticed with surprise that one of the most unsanitary districts was almost exempt from the visitation. The majority of the inhabitants, being Italians, were great onion eaters, and strings of this vegetable were found suspended from the ceiling of nearly every room. The medical officer of health concluded that the onion, among its many virtues, contains a powerful antidote against cholera morbus, and, possibly, other diseases.

Much Public Land to Be Watered.

Here is a condensed list of projects that are to be taken up following those now in hand that it will pay the intending farmer to keep his eye on, as there is much public land embraced in them. They are waiting for plans to mature or for funds to become available. It may be some years before some of them are carried out, however:

Little Colorado, Arizona, 80,000 acres, $4,000,000.

Sacramento Valley, Cal., 500,000 acres, $20,000,000.

San Joaquin Valley, Cal., 200,000 acres, $6,000,000.

Colorado River, Colorado, Utah, California and Arizona, 750,000 acres, $40,000,000.

Dubois, Idaho, 100,000 acres, $4,000,000.

Lake Basin, Montana, 300,000 acres, $12,000,000.

Las Vegas, New Mexico, 35,000 acres, $1,500,000.

Urton Lake, Roswell, N. M., 75,000 acres, $2,000,000.

Walker and Humboldt Rivers, Nev., 500,000 acres, $15,000,000.

Red River, Oklahoma, 100,000 acres, $4,000,000.

John Day River, Oregon, 200,000 acres, $10,000,000.

Weber, Utah, 100,000 acres, $5,000,000.

Priest Rapids, Washington, 50,000 acres, $2,000,000.

Goshen Hole, Wyoming, 120,000 acres, $4,000,000.

Hope's Fancy.

Within the circle of the sunset sky,
Above, a panoply of crimson hue,
Below, the Hope that never dies
Strives ever onward to the true.

Thoughts of God's foreordained plan,
Amidst the circling worlds in space
Emotions waken mind in man,
To glorious goal for human race.

Fancy empiric, o'er Reason's throne
Robes majesty in wondrous rays,
Implants faith in hearts that love,
At brightest dawn, or darkest days.

In lowly cot, or lordly hall,
Where climbing reason wings its flight
To worlds unknown above the pall
That covers earth with sorrow's blight.

Fancy thou can'st know, ah, who can tell
The breadth or space of heavenly light,
Or lowest sphere of darkest Hell,
Or the vaulted grave's eternal night.

Hope gleams within a sparkling ray,
Soothing the spirit with wondrous balm,
Of a fancied life beyond our ken,
Dying, but to wake in glorious dawn.

—D. Buchanan, 330 Third Ave.,
San Francisco, Cal.

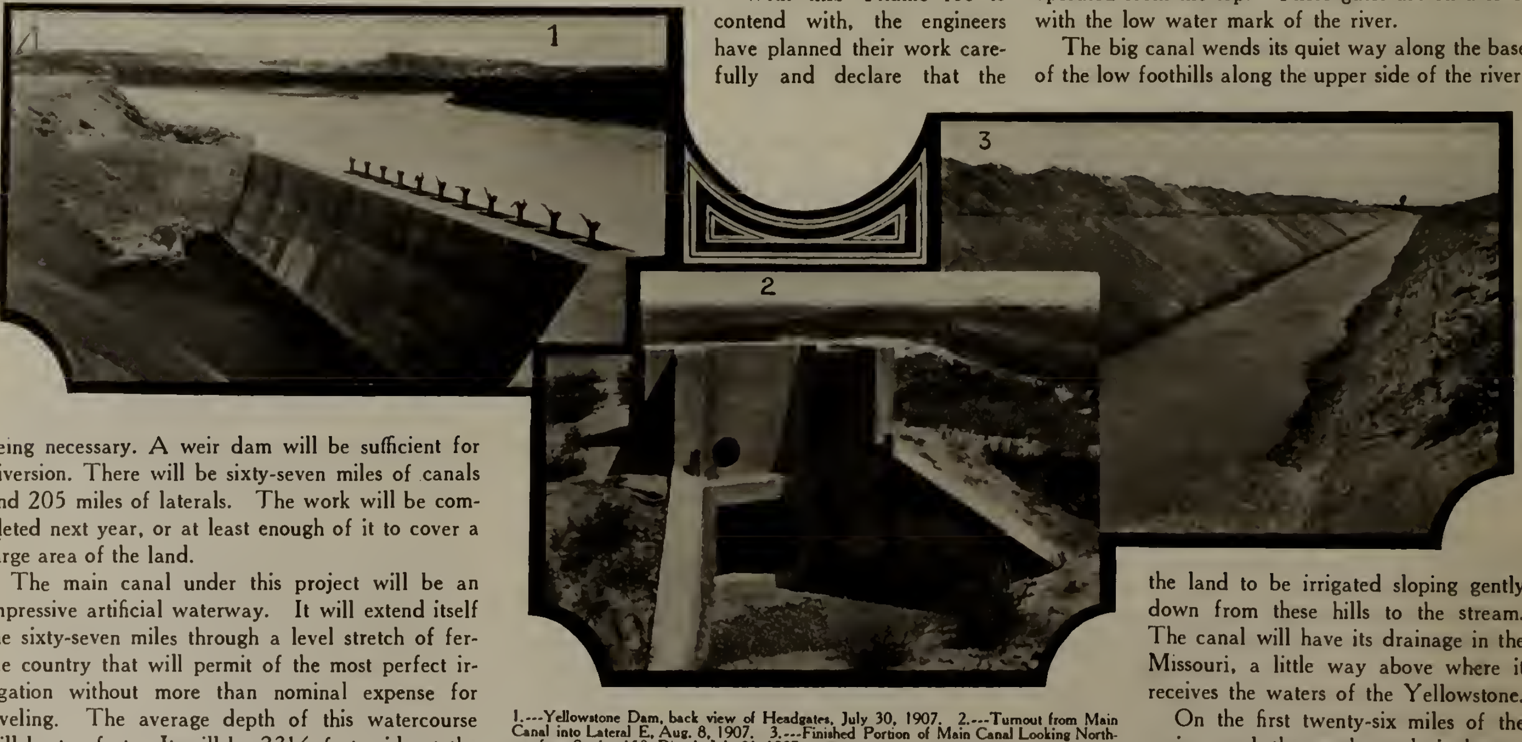
NORTH DAKOTA-MONTANA PROJECT

Yellowstone Waters to Redeem Large Area

LARGE ARTIFICIAL WATERWAY WILL CARRY THEM FOR SIXTY-SEVEN MILES, THROUGH LEVEL SWEEP OF TILLABLE COUNTRY THAT WILL YIELD GOLDEN RETURNS TO THE SETTLERS

THE Lower Yellowstone Project is one of the larger ones by which Montana will benefit. It is in the Glendive region and will irrigate 66,000 acres of land. Of this 20,000 acres are just across the line in North Dakota, but virtually tributary, with the rest of the tract, to the Montana city. The area to be watered is on the west side of the Yellowstone River, and has been "dry" farmed to a large extent. About 35 per cent of it was public land at the time the government began work.

This is another of the comparatively inexpensive systems, no big dam or other unusually costly work being necessary. A weir dam will be sufficient for diversion. There will be sixty-seven miles of canals and 205 miles of laterals. The work will be completed next year, or at least enough of it to cover a large area of the land.



1.---Yellowstone Dam, back view of Headgates, July 30, 1907. 2.---Turnout from Main Canal into Lateral E, Aug. 8, 1907. 3.---Finished Portion of Main Canal Looking Northeast from Station 158, Div. 1, July 31, 1907.

The main canal under this project will be an impressive artificial waterway. It will extend itself the sixty-seven miles through a level stretch of fertile country that will permit of the most perfect irrigation without more than nominal expense for leveling. The average depth of this watercourse will be ten feet. It will be 23½ feet wide at the bottom and at the surface of the water when flowing at capacity, 53½ feet across. It will carry 840 second feet and its fall will be only one foot in 10,000, approximately but one-half foot in a mile.

The government contract calls for the completion of this canal by January, 1908, but it is not thought it can be finished by that time, though six principal contractors and at least a dozen sub-contractors are at work with what men they can muster and what teams they can handle. Scarcity of labor has prevented the operation of some of the grading outfits. Three large steam dredgers are assisting in the work.

Great ice gorges that form in the Yellowstone in the spring are a problem that the engineers had to consider when preparing plans for the works under this system. Dam and headgates are faced with steel and heavy timbers. Sometimes these gorges, forced down by the might of the high water behind them, sweep every ordinary structure before them. A gorge of this nature tore away the long bridge at Glendive a few years ago, lifting it bodily from its foundation, though its floor was twenty feet above high water mark. The heavy iron and steel girders of the bridge were twisted and broken by the force of the gorge as if they were straws.

With this Titanic foe to contend with, the engineers have planned their work carefully and declare that the structures put in by them will resist the heretofore conquering power of the destroying ice gorges.

Swiftest and Straightest of Rivers.

The Yellowstone is known as one of the swiftest and straightest in its course of all rivers. At Reno Bend, eighteen miles north of Glendive, there happens, however, to be a sweeping curve and here, where the water is thrown naturally against the headgates, is the point of diversion to the canal. A rock-filled timber weir dam, 650 feet long, is being thrown across the river at the bend, on a pile foundation to raise the water six feet that it may fill the canal to capacity after passing through the headgate. The dam will join the face of the headgate at the lower end of the latter.

The big heading to the canal, built of concrete and steel, has been completed. It is a work of magnitude and represents the best that the skill of the Reclamation Service can accomplish in that sort of work. The great gate is 180 feet long on its face, which is supplemented by 80-foot end wings, swinging inland. This gate is 42½ feet high from the foundation. At the base of its face are eleven five-foot circular sluice gates, each, as usual in such works, being regulated separately by handscrews, operated from the top. These gates are on a level with the low water mark of the river.

The big canal wends its quiet way along the base of the low foothills along the upper side of the river, the land to be irrigated sloping gently down from these hills to the stream. The canal will have its drainage in the Missouri, a little way above where it receives the waters of the Yellowstone.

On the first twenty-six miles of the main canal the earth work is heavy, four and a half miles being in a deep cut and thirteen in steep sidehill. Small creeks are crossed at grade by means of culverts and the big canal drives under the larger one of these in concrete conduits. For thirty miles the amount of irrigable land is small, but after that the valley increases to five miles in width and the real irrigable area begins.

Water Will Be Pumped to Bench Land.

Water will be sent up the hill slope also under this project, to irrigate lands that lie above canal and river, and which nobody ever expected to see water taken to. Sufficient power will be developed from the canal to pump water to about 2500 acres of bench land lying above Tokna, about eighteen miles from the headworks. One of the features of the work done by the government engineers is the manner in which they utilize every odd scrap of power, or water, or land, like a careful housewife making use of the odds and ends. Every remnant of land that can be reached and watered economically is taken in and water carried to it by some sort of ingenious device. The result in some cases is gardens in the air.

The preliminary investigations for this system were made during the field season of 1904. Contracts for work were let during the following summer, but real construction was not well under way until the spring of 1906. One large contracting plant went into the hands of a receiver and was taken over by the Reclamation Service. Another contractor failed to go ahead with the large division of the work he had engaged to prosecute. There was unusual rainfall—bringing joy to the "dry" farmers—in May and June, 1906, 5.25 inches of rain falling in the former month and 9.8 inches in the latter, which caused much delay.

Work is going on rapidly now, however, and the big system will be ready in good season, even if delayed some. Fine progress is reported on the seventy-four miles of laterals for the first tract, 28,000 acres, to be irrigated.

Large Percentage of Government Lands.

Of the lands under this project, 35 per cent was government and railroad acreage. Most of this has been taken up by settlers. Some of these, not having money enough to go ahead with their improvements, will relinquish and besides there is plenty of good land under the project for sale by "excess" owners at reasonable figures. This gives new comers into the region plenty of chance to obtain fine homes cheap.

The government report classifies the soil as a deep, sandy loam, one of the most fertile and easily worked varieties. It places the value of the irrigated land, when improved, at from $60 to $80 an acre.

The cost of the Lower Yellowstone Project will be in the neighborhood of $2,000,000 and the price per acre for water rights about $30. The farm unit for government and railroad land will be eighty acres beyond the two-mile limit about towns and forty acres inside that. Tracts of 160 acres may be purchased from private owners. This is a good deal of land to farm successfully by irrigation in this section, though. The soil being rich more money is made from the smaller tracts carefully and thoroughly tilled and with selected crops.

Besides the local markets there are large cities in the nearby East, which will take all the surplus, especially live stock and meats. Alfalfa that is not sold for hay will fatten cattle and the sugar made from the beets is sold all over the country. There is a demand for all that the farmer will grow in this region. There is plenty of railroad transportation, and an important and growing city, Glendive, is within the tract.

Glendive, on Northern Pacific, in the Irrigation Belt

THRIVING MONTANA CITY, SURROUNDED BY RICH SECTION OF LAND, A GREAT PART OF IT WATERED, OFFERS INDUCEMENTS TO FARMERS AND TO CAPITAL

WHEN a town is already a bustling, busy, growing place because of the natural and ordinary advantages surrounding it, and the United States government comes along and gives it another lift by leading a copious supply of water upon a big area of rich land tributary to it, it is a good place for the man that wants to make money or get a start in the world to move to. There is nothing like irrigation to send a progressive young city up with a jump. Glendive, seat of government of Dawson county, Montana, located in one of the richest of agricultural and stock-growing belts in the Northwest, is getting its growth under the fortunate conditions mentioned.

Glendive is one of the prosperous places that the reclamation of arid lands by the government has brought particularly into public notice. The Lower Yellowstone Project is destined to add much to its growth and business importance. The influence of the new factor is being felt already. There is an increased air of rustle and energy and expansion about this city of 3,000 that shows it. Glendive is well on the upward way.

When the Northern Pacific Railroad was built through the site now occupied by Glendive, that city consisted of a cluster of log houses. Stock-raising supported it in the main. It was headquarters for the vast cattle region that stretched for miles about, the rank growth of feed showing that the land was of fine quality. The farmer began to note this and tracts were cleared and tilled. Heavy grain and hay crops were produced. Settlers began to acquire the land and the stockmen were driven further and further back, but always finding good range as they retreated, so that that industry was only pushed further to the rear and did not suffer as the lands were turned into farms.

Glendive Grows With Country.

Glendive grew with this settling of the region. Its business increased and it gradually became a commercial center, its trade extending throughout the region for many miles around. Today it is not only the center of an irrigated empire, but is headquarters of a Northern Pacific division, extending from Mandan, North Dakota, to Billings, and is, in fact, the only city of importance for a stretch of 200 miles along that railroad, all productive to a greater or less degree and all tributary to Glendive.

The repair shops of the Northern Pacific are located at this point, also the store room for the entire division, a round house with accommodations for thirty engines, and other departments necessary for the maintenance of a large section of a great transcontinental road. This adds greatly to the activity and life of Glendive. The railroad payroll exceeds $20,000 a month in this city.

Advantageous position is a large part of the battle in a town's commercial advance. Located just west of the North Dakota line, Glendive is known as the "Gate City" of Eastern Montana. It is the distributing point for the Yellowstone Valley, one of the broadest agricultural expanses in America, only needing the impetus of new blood and energy, which is rapidly pouring in, to make it a rival of any of the great industrial centers of the world.

Glendive has all the modernness of the new municipal growths that are taking place throughout the West. It is clean and well lighted, electricity being used. The streets are finely paved and there are some miles of concrete sidewalk. The water supply is excellent and abundant. A complete sewer system has been installed and there is also a fine telephone system.

The city is governed by a complete set of municipal officials, who are full of progress and alive at all times to the welfare of their city. Every encouragement is given by them to persons that come to establish themselves in the place. New industries are being started largely because of the good government and low tax rate.

Glendive asserts that its educational facilities are not surpassed by those of any other city of its size or class, and that few equal them. It has three school houses, with a corps of selected instructors, and also a high school which is abreast of any in the state in the way of teachers and equipment. There are well-built and commodious churches.

City Substantially Constructed.

Glendive is a substantially constructed city. The business buildings are of brick, and a good deal of attention has been paid to architectural lines, which gives the business section an attractive appearance. All the residences are comfortable and built with regard to taste and appearance. Some of them are very handsome. The people here being generally prosperous and money being plenty, unusually attractive homes are the rule. Shade and ornamental trees line the streets of the residence section, adding to the general beauty of the place, and there are some pretty little public parks.

The direct influence of the construction by the government of the irrigation system is felt at Glendive already because of the immense amount of money being spent in carrying on the work. Glendive is the headquarters for the work, Project Engineer Weymouth having established himself there with his corps of clerks and assistants. It is also the supply depot for the project. A good road has been constructed from the town down the course of the canal, and not only is freight hauled over this, but a stage line has been established, which makes daily trips over the route, connecting all the points and camps along the ditch. A number of little towns that were unknown at the time the work commenced have assumed prominence since, through becoming supply points for the different contractors employed in prosecuting the great work. These are all tributary to Glendive, the original source of supply, and it prospers under the accumulated benefit. One of the biggest contractors on the canal makes his headquarters at Glendive, and the rest all look upon that as the main point for the receipt of machinery and wholesale supplies.

While the actual construction of the system is bringing much to Glendive, it is nothing compared to what it will receive in the way of population and business when settlement of the lands begins. To be the central supply depot for a region where virtually everything must be bought new, from clearing implements to harness, household goods to rabbit-proof fences, means a boom in trade. To be the central supply depot for all the farmers of a new region means a permanent flood of business.

Region is Healthful.

Men who seek new homes and wealth generally wish for health, too. They may be lured into unhealthful regions in the search for gold or silver mines, but there are too many agricultural regions of promise where climate and other conditions conduce to vigor and long life to leave much chance for those where the vitality may be sapped. The healthful region is sought today. The Valley of the Yellowstone cannot be surpassed for strong and vigorous men and women. The climate is one that braces and builds up. The settler acquires an iron constitution while acquiring a competency, the former permitting him to enjoy the latter to the fullest. Glendive with its cleanliness, its open situation and its splendid water is one of the most healthful cities in America.

Irrigation farming, while it is a great source of wealth, is not depended upon alone by the agriculturist in the Glendive section. The wide stretches of land that can not be, or have not yet been reached by irrigating ditches are all susceptible of producing crops. Many ranchers have grown rich from "dry" farming them. These lands produce heavy crops of grain and forage with cultivation and only the natural moisture. More of them are being broken up each year by men who have noted the profits to be derived from them. The production of hay upon them is an especially profitable industry, there being such a large amount of stock in the territory that there is always a market at good prices for forage. Corn and other crops are also produced profitably upon the unirrigated lands if they are given proper cultivation. Farmed in larger tracts the expense of planting and harvesting crops on these lands is comparatively small.

Plenty of Land for Settlers.

Every man that has his desert land or homestead right left has a chance to acquire a tract of government land in the vicinity of Glendive. There are opportunities to obtain the irrigated land by purchasing relinquishments from those who have not the small amount of money to carry on their improvements and perfect title. This land will become immensely valuable under cultivation and will produce a good living by the growing of alfalfa and beets the first year it is tilled. The desert land entries will be valuable when the government and private irrigation systems are extended to them. The locator can hold 160 acres of his desert land entry even under a government irrigation system, it being classed as private land. This amount of land in this region, with water, would make one independently rich. Then there is still unlocated land upon which there is a good rainfall, which will produce fine crops of hay, grain and corn. It will pay every homeseeker to visit Glendive and examine that region.

There are plenty of irrigated and other lands to be bought in this section at very reasonable figures. Properly improved it would be worth many times the purchase price.

Careful records kept in the so-called dry farming sections—that merely means farming without irrigation—show that an average of forty-five bushels of oats are raised to the acre, twenty-three and a half bushels of wheat, and nine bushels of flax. This is better than is done under canals in some sections.

One man from Garnett, Anderson county, Kansas, bought 160 acres of land cheap not far from Glendive, in what is known as the Thirteen-mile Creek district, and homesteaded 160 acres adjoining. On this unirrigated land he raised satisfactory crops of potatoes, cabbages, mangels, turnips, oats, corn, and other vegetables and cereals. The land broke well, he said, and there was plenty of water at from ten to forty feet for domestic use—and perhaps for pumping with small engines. He advised many friends to follow his example and they acquired tracts of 320 acres by buying and homesteading. There is still much land of this nature left in the Glendive locality.

A young man who had been farming at Newlon, one of Glendive's tributary towns for the last five years, is worth $17,000. He has only 400 acres of land under cultivation. He located a quarter section and bought a section adjoining from the Northern Pacific. Oats have been his principal crop. The poorest yield, in 1900, when the rainfall was light, was from twenty to thirty bushels to the acre. In 1905 he harvested 17,000 bushels from less than 400 acres, and in 1906, 22,000 bushels. Some wheat he planted yielded forty-five bushels an acre, and flax fifteen to twenty-bushels, while all sorts of vegetables grew splendidly.

Some farmers have made from $20 to $25 an acre from wild hay on the "dry" lands in different seasons.

Coal and Wood for the Hauling.

One settler has written: "We get plenty of good coal free for the digging, plenty of dry cedar wood for kindling. Our cabin is comfortable. We have plenty of milk, potatoes, meat and beans for food. For what more could a settler on a lone prairie ask? I have bought one quarter of land which has doubled in value in one year. If I have success this year I expect to buy another quarter."

Coal abounds in the Glendive country and furnishes a cheap fuel in town and for the settlers. It will render manufacturing inexpensive. The whole country is underlain with lignite coal de-

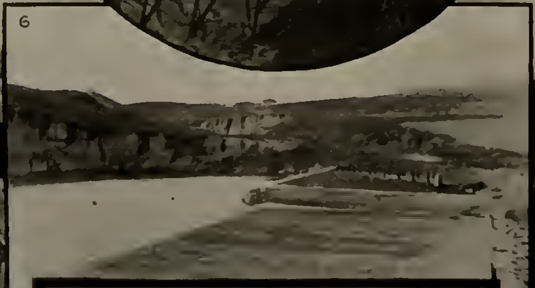
1---City Hall, Glendive.

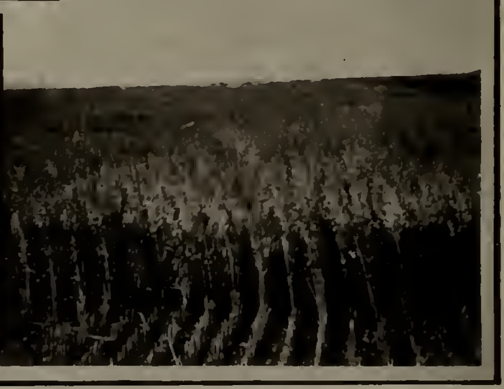
2---A passing glimpse of Glendive, showing High School in distance.

3---New High School, Glendive, Mont.

4---Irrigation flume of the Glendive Land and Stock Co.

5---Glendive Land and Stock Co.


6---Irrigation reservoir of the Glendive Land and Stock Co.


7---Glendive Land and Stock Co.

8---A busy spot in Glendive.

posits. There are outcroppings from which settlers actually load their wagons. The failure of the railroads to haul this fuel during the winter of 1906-7 caused no suffering there. Veins of the best quality coal have been traced for miles in this region.

Lands in North Dakota, near the eastern line of Montana, that were sold five years ago for from $5 to $6 an acre, are today worth from $15 to $24 an acre and good crops are being taken from them. Lands exactly similar are being offered in the Glendive country, across the line, for from $8 to $12 an acre. Beside this there is government and railroad land. All this land yields abundantly. Dawson county has miles of level, fertile land for the homeseeker. Many are taking advantage of the opportunity offered and a great influx of people is looked for.

The climate of Glendive and its surrounding locality is very pleasing. The atmosphere is rarefied and pure. Cold weather is usually of short duration and the sun shines with the geniality of summer throughout much of the winter. Warm chinook winds temper the cold period. Livestock runs free on the ranges all winter. There is no humidity. The precipitation of moisture in the summer is sufficient to produce crops and feed.

The land in this region has no brush that has to be cleared off. The soil is a rich black loam, free from rock and stone. The use of steam plows has been found profitable in breaking large tracts of it. Eighty per cent of the land is level and capable of being broken easily.

There is water in many places from springs and clear running streams, and always at a reasonable depth in wells. No great expense attaches to the sinking of wells of a sufficient depth to obtain a supply.

Market for the Produce.

Minneapolis and St. Paul are ever absorbing markets for the lands of the Lower Yellowstone Project, but the growing local demand keeps up with the production, so good prices are always obtainable at home.

With the rich surrounding country and the added benefits of extensive irrigation, Glendive must grow. There are opportunities there for business men in many lines. Excellent returns could be derived from another hotel of large size, a department store, restaurants, novelty store, boarding houses, clothing stores, wall paper and paint store, flour and feed store, and many manufacturing lines. Cheap coal is bringing factories to Glendive. Most of the things needed in the community, including farming implements, could be made at this place.

The Business Men's Association of Glendive has prepared literature that will be sent to those desiring a home or a business opening. All inquiries will be cheerfully answered. Personal visits to the locality are requested. The fullest facilities for obtaining information will be supplied.

Being a county seat of government adds to the importance of Glendive. The enterprise of its people is shown in the handsome courthouse and other public buildings of attractive design that have been erected. Besides the low tax rate, water and light are cheap. Being an agricultural and stock-raising community, food products are necessarily obtainable at something near the prices that the producer himself obtains, which is satisfactory to him, but appears very low to people used to paying the dealers' profit in cities. Comfort and plenty are to be had at small cost in Dawson county.

OKLAHOMA TO RECEIVE BENEFITS OF RECLAMATION ACT

THE Reclamation Service expects to bring many thousand acres in the more arid portions of Oklahoma under irrigation. The western part of that Territory contains miles of level and rich land upon which crops are uncertain because of erratic rainfall. Even when there is a sufficient precipitation it may be so badly distributed as to permit a crop failure. To develop a supply of water for this region and find sites for reservoirs to store it are the concern of the Service. The question whether water can be brought to the lands at a cost to justify the undertaking, is another that must be determined. It is thought that there are several feasible projects.

Reconnoisance surveys have been made on all the streams in this semi-arid region of the western part of the Territory and stream measurements have been taken since April, 1905. Surveys and examinations of every possible site for an irrigation project on the Cimarron and Canadian Rivers, Beaver and Wolf Creeks and the Washita and Red Rivers and their tributaries have been made. No great encouragement has been experienced in the search for reservoir sites. With the exception of the main Cimarron River, above Garrett; the north fork of the Red River, at points near Snyder and Lugert, and Otter Creek, near Mountain Park, the streams examined occupy sandy valleys that do not close at any point where storage dams could be built economically of stone or earth. The material is not there for the masonry and there is no bedrock for the bases or abutments of dams.

Besides these untoward features, the streams are irregular in their flow. They are practically dry at certain seasons, deficient in volume ordinarily, but subject to violent floods at intervals. There must be ample storage to utilize such streams. The largest and best site for a reservoir that has been found is on the North Fork of the Red River, in Greer and Kiowa counties, near the towns of Headrick and Snyder. It is known as the Navajo site.

Extensive surveys and examinations have been carried on this proposed site. Diamond drill borings have been made at the place where the dam would rest to determine the nature of the underlying strata. An experimental irrigation pumping plant of the Byron Jackson make has been established, through which the water from Red River will be used on different crops to test its efficiency and also test the duty of water in this region—that is the amount needed per acre for producing crops. The earthquake in San Francisco delayed the installation of this plant, a sixteen-horse-power gasoline engine and a six-inch centrifugal pump ordered in this city in April not being delivered until June. There happened to be rain enough to carry on the experiments, however. There is a lift of twenty-one feet, yet 200 acres are covered by the plant.

Dam Across the Red River.

The building of a dam across the North Fork of the Red River would store 200,000 acre feet of water, sufficient to irrigate 100,000 acres of land. About 12,000 acres would be submerged by the reservoir, but of this only 530 is first class land. It has not yet been determined whether the salty water that would be obtained from this source would be of a quality suitable for irrigation or whether enough could be developed to fill the reservoir. It is thought that investigations on these points will result satisfactorily.

Topographic surveys have been carried on in the vicinity of Salt Springs on the Elm Fork, and surveys have been made of a canal line diverting the low water flow of Elm Fork. A survey has been made of a canal line diverting the low water flow of Elm Fork to eliminate part of the salt water of this stream from the system. Already canal surveys have been made for distributing the water to 30,000 acres in Greer county and 30,000 in Kiowa county, and an alternative canal system has been surveyed for irrigating 30,000 acres in Kiowa county and 70,000 acres in Comanche county. Soil examinations have been made, water analysis carried on and stream measurements systematically prosecuted in this locality.

The first lands proposed for irrigation were 30,000 acres in Greer county and 30,000 in Kiowa county. Tests showed the Greer county lands to be a tight clay soil that would be difficult of drainage and later surveys were made for irrigating a large area of sandy land in Comanche county. All lands considered in the project are level and exceedingly fertile. The acreage, unfortunately, is far greater than the available water can serve.

THE COLORING OF BUTTER.

Discussion at the National Pure Food Convention. at the Jamestown Exposition.

F. L. Austin, in New York Tribune Farmer.

The pure food convention held at the Jamestown Exposition, Norfolk, Va., July 16 to 19, drew together not only pure food commissioners and food chemists from nearly every one of the Eastern and West Central States, but it also counted among its number several dairy commissioners.

One phase of the pure food question directly affecting and of considerable interest to dairymen was the discussion of artificial color in butter. There seemed to be two distinct views quite in opposition to each other, and each side was backed by prominent men. One view was that color is added to butter for the sake of deception and should be absolutely prohibited on that account. This view was enforced by contrasting January and July butter. The deception, it was claimed, is in trying to make midwinter butter look like June butter.

The opposing view was that color should be permitted, provided it be a harmless color. Nothing but purely vegetable color should be permitted. So long as harmless colors are allowed in other foodstuffs the butter maker should be allowed to use enough harmless color to bring his product "up to color" in order to satisfy the majority of people, who are dissatisfied with their butter if it is other than of a rich golden color.

The convention as a whole favored the prohibition of all artificial coloring matter in all foodstuffs. A grand campaign of education must be carried on before the people will accept such a change willingly.

OREGON PROJECT

Umatilla Project and City of Hermiston

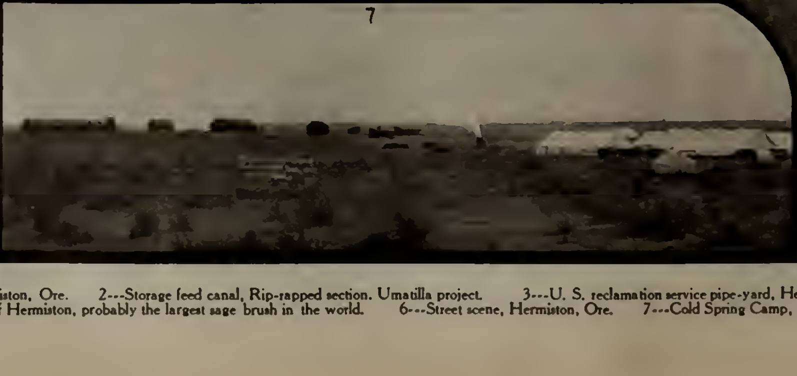
RICH LANDS IN SECTION WHERE MARKETS FOR FARMERS ARE MANY AND TRANSPORTATION CHEAP ARE BEING BROUGHT UNDER AMPLE SUPPLY OF WATER

WHEN the government casts its eye over an irrigation project proposed to be carried out under the Reclamation Act, about the first thing it has to determine, after finding that plenty of water is available, is whether the cost of carrying the water to the land is justified by the fertility of the latter. In some cases where the construction of the irrigation works is comparatively simple this question is easily determined, even if the land is but fair. In others thorough research and soil tests are necessary, and several proposed projects have been rejected because the quality of the land did not warrant the expense of watering it. Wherever the cost of developing water is high the government experts satisfy themselves that the land is of the finest and capable of returning adequate reward for its tilling.

Under the Umatilla project the cost of water rights will probably be higher than under any other. It needs fine land to justify this. The experts of the government made all sorts of tests of the soil and of the climatic advantages for the growing of crops, and then decided that, in spite of the expense, the works should be put in. It was satisfied that settlers would take the land.

An allotment of $1,100,000 was made on December 4, 1905, for carrying out the Umatilla Project. Under it 20,000 acres bordering on the Columbia River, near the mouth of the Umatilla, are to be irrigated. The project is divided by the latter river into an east division and a west division. The lands of the east division will be irrigated by waters from the Umatilla, and those of the west division, at some later date, from the John Day River by a gravity system, or from the Columbia River by a pumping plant.

The rainfall is only nine inches annually in the Umatilla Valley. This means that plenty of water will be needed, and there certainly will be plenty of it. The plans provide for 4.25 acre feet to be diverted from the river for each acre to be irrigated. It is estimated that 2.8 acre feet of this can be delivered after the lands and the canals have



1---Government dam under construction, Hermiston, Ore. 2---Storage feed canal, Rip-rapped section. Umatilla project. 3---U. S. reclamation service pipe-yard, Hermiston, pipe 8' x 50" diam. 4---Rock section, storage feed canal, Umatilla project. 5---Sage brush of Hermiston, probably the largest sage brush in the world. 6---Street scene, Hermiston, Ore. 7---Cold Spring Camp, Umatilla project, Hermiston, Ore.

been thoroughly wetted and silted up, or by the time the entire area is under cultivation.

Cold Springs Dam Ninety Feet High.

Water will be taken from the Umatilla River by a diversion dam to a reservoir that will be formed and carried through a feed canal by building what will be known as the Cold Springs dam. The feed canal will head on the Umatilla River and will be twenty-five miles long. It will have a capacity of 300 second feet at the point of diversion. All the structures will be of concrete.

The Cold Springs dam will be an earth and gravel structure, ninety feet high over the lowest point of the natural surface. The dam will be approximately 600 feet long over the deeper portion, but it will have a total crest length of 3400 feet. The capacity of the reservoir will be 50,000 acre feet. There can never be a shortage of water, for the estimated run-off of the river at the point of diversion reaches the immense volume of 600,000 acre feet.

The main distributing canals will have a length of twelve miles, and there will be 128 miles of laterals.

The surveys for the Umatilla project were begun in the spring of 1905, and bids were opened on June 28 and 29, 1906, respectively, for the contract of constructing the Cold Springs dam and the storage feed canal, from which the reservoir is to be filled. It is confidently expected that the project will be opened with a full supply of water for the lands in the spring of next year.

The reports of the government engineers are a flattering testimonial to the value as a home and farming region of the 20,000 acres that are to be irrigated in the east division by the initial work of the project. The Weather Bureau records, it is stated, show an average of nearly seven months between killing frosts. The winters are usually mild and open and the summers hot, the reports continue. The winter temperature rarely falls below zero, and then for a few days only. The summer temperature occasionally reaches 110.

Irrigated Lands Reach Big Value.

The public lands under the Umatilla Project consist of alternate sections patented to the Northern Pacific Railroad Company, which are purchasable by settlers under the terms of the grant. The government engineers, always conservative in figures, place the value of irrigated lands under this project at from $150 to $250 an acre.

"The lands are rolling and very fertile," the engineers say. "There is no alkali apparent on the surface, and wells show underground water remarkably free from it for an arid region."

Ten, twenty and forty acres have been spoken of as the possible size of farm units under this project. It is quite likely that the land will be deemed fertile enough to amply justify smaller parceling. The smaller units will be near the towns, as is the rule of the Reclamation Service. It is likely that twenty acres will be finally settled upon as the smallest unit, however, the engineers seeming to be about agreed upon this.

In regard to the west division of this project, investigations have shown that diversion from the John Day River for the purpose of irrigating the lands in this segregation would involve the expenditure of many million dollars, because of the tax upon the Reclamation Fund, studies of the irrigation of this land from this source have been discontinued for the present.

High Fertility and Fine Location.

"But the high fertility, low altitude and the exceptional location of these lands," as the engineers put it, would not permit the service to abandon the effort to water them. Surveys have been made to determine the feasibility of pumping from the Columbia by means of power developed on the Deschutes River. The lower thirty miles of the canyon of this stream has been looked over and sites for power dams located. The fall of the Deschutes ranges from twelve to fifteen feet per mile. The sides are generally bold and rocky. The power sites located promise development of 30,000 gross horse-power each.

A power transmission line from sixty to seventy miles long would be required to convey the electricity to the Umatilla Project. There are about 58,000 acres in the west division that can be reached with a 300-foot lift. A 200-foot lift will suffice, however, for 33,000 acres of land.

Storage reservoirs are necessary for this scheme, that the pumping may be carried on continuously. The surveying of sites, that it is thought will supply storage reservoirs, is in progress.

The public lands affected by this proposed pumping enterprise have been withdrawn from entry, as well as all unappropriated water rights.

Hermiston, a growing city that sprang into being because of the land development that is going on around it, is the central city of the Umatilla Project. Here the government engineers have their headquarters, and from this place all supplies are sent out to the works. It is here that the newcomer to the Umatilla region leaves the train and makes his first acquaintance with this section. The little city is on the main line of the Oregon Railroad & Navigation Company's Railway.

There is about everything that nature could supply to attract homeseekers to this locality. There are rich lands that may be had for prices far below what they will be worth under proper cultivation, a splendid climate, good markets and excellent transportation facilities, both rail and water. A large proportion of those who are looking for homes under the government projects are studying the Umatilla Valley and many are already journeying to Hermiston and establishing themselves on private lands surrounding it. The date of the opening of the public land is not far away.

Price for Water is Really Low.

The price for the water right—$60 an acre—is not deterring any of the settlers. In many irrigated regions where water is supplied by private corporations farmers pay more than this each year for water for land that is not nearly so good as that of the Umatilla Valley, and are glad to get it at that price. Then, too, it must not be forgotten that they are not acquiring any right to the water, but must pay this annual charge as long as they farm the land, and their heirs must pay it after them for all time. Under the government project the farmer owns the water right at the end of ten years, so each year he is really only paying an installment on something that is to be his eventually. The water right once acquired, it is an asset that goes forever with the land, and the more it costs the more it is worth as an asset. It is likely that some farmers in irrigated regions not controlled by the government have paid to date as much as $150 an acre for water and do not own it today.

A little calculation will show that the main thing to be considered in acquiring the government water right is, does the land justify the price? That it does, you have the guarantee of the government experts, after all the expensive scientific tests they have made, covering every phase of the matter and considering every contingency. You never doubt the genuineness of the government's guarantee behind banknotes, and you have about the same guarantee behind the irrigation projects.

Many varieties of valuable crops can be produced in profusion on the lands of the Umatilla Valley, as has been demonstrated by the irrigation already practiced on a small scale. The Maxwell Land and Irrigation Company and the Cold Springs Irrigation Company supplied water for several thousand acres of good land, and it has proved highly productive. These companies controlled a large portion of the irrigable lands. The works were dependent upon the flood flow of the Umatilla, and they had no water for midsummer irrigation. The government obtained the subscription of the lands of these companies and bought their canal systems entire. These lands will, under the law, have to be cut up into farm units and sold. Settlers will obtain them at a minimum price.

Soil of Great Depth and Richness.

The soil of the Umatilla Project is of a light, sandy loam of great depth and richness, and lies in rolling benches along the Columbia and between it and the Umatilla. These benches are the main cause of the expense of watering the lands, the system of distributing canals and laterals being made rather complicated and relatively expensive because of them. They give the advantage, though, of easy drainage, which will make alkali impossible and prevent them becoming water logged. The natural growth of sagebrush and buck and rabbit brush, with bunch grass and cactus interspersed is heavy and shows that the lands have high productive qualities.

As already stated, the curse of alkali is not upon this region. The least care, with the natural drainage, will prevent it ever gathering to annoy the farmer and end his hope of wealth just when he has brought his land to the highest state of cultivation.

The altitude of the Umatilla region is only 400 to 500 feet. More than two inches of rain rarely come in one month. A dry and healthy climate results. The winters are short and the summers long and mostly of sun, with cool nights. Sometimes there is a light snowfall in winter that rests on the ground for a day or two and but serves to give the tang of an Eastern fall, without any of the severities of the North Atlantic winters.

When the temperature is 110 at Hermiston one feels more comfortable there than in the East at 75, for there is no humidity to drag you down. You feel like working all the time and this willingness helps greatly in the clearing of land and raising of crops. The low altitude has much to do with the mild climate and the lengthening of the growing season in this highly favored spot.

Growing Season is Unusually Long.

It is claimed by the Hermiston people that the long days of summer there give the Umatilla Valley a growing season actually fourteen days longer than that of Southern California, and thirteen days longer than the region around the mouth of the Snake. The profits from irrigated lands in the latter region, it is said would tax credulity, and the soil water and general character of the country are the same as under the Umatilla Project.

It is admitted by the people of the Umatilla region that their region is not entirely perfection. In the spring windstorms of two or three days' duration are common. This drawback will disappear entirely, though, they say, with cultivation of the lands. As the land is seeded down and windbreaks established, Boreas will gradually lose his power to bring discomfort.

No part of the entire 20,000 acres under the project is more than five miles from a railroad at any point and in addition to this there is the Columbia River, on which freight is sent in constantly increasing volume, the tariffs being regulated by this water competition. Soon the government locks at Celilo Falls will be completed and the Columbia River will be navigated by steamers from the ocean to the mouth of the Snake, thirty miles above Hermiston. This will make transportation rates even more reasonable than they are now.

The main line of the Oregon railway and Navigation Company passes through the heart of the irrigated section and the Portland-Spokane branch skirts the project on the north. Across the Columbia the Northern Pacific and the Great Northern railroads have built transcontinental lines to Portland, Ore. These systems will be connected in time with the Umatilla Project by ferries, wagon roads, and later by electric lines.

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1.--Residence of A. C. Crawford, Hermiston, Ore. 2.--Morgan Hotel, Hermiston, Ore. 3.--Residence of Colonel Newport, Hermiston, Ore. 4.--City of Hermiston, growing center of Umatilla Project.

Present facilities give frequent and thorough service to all parts of the country. Travelers and perishable products are transported to Portland in eight hours.

Splendid Market Advantages for Farmers.

No other section has a more marvelous location or advantageous markets than that of the Umatilla Project. It is within 189 miles of Portland, 250 of Spokane and 55 of Walla Walla, Seattle, Tacoma and the principal cities of the mining states of Idaho and Montana are within easy reach and all will want the products of the Umatilla Valley.

The government experts say that the Umatilla Valley will grow grapes with success and they say the same thing about the growing of fruit there. The soil and climate of this section are especially adapted to the profitable cultivation of the great staple forage crop, alfalfa. The long, warm season makes four crops a year possible and this gives the farmer nine tons an acre, each season. It is worth from $6 to $8 a ton. There is always a sure and steady profit in this crop.

Of the larger money-makers, potatoes, sugar beets, cantaloupes, watermelons, strawberries and vegetables of all varieties will yield well.

Peaches, cherries, prunes, plums, apricots, apples and all deciduous fruits find a natural home in the Valley. Properly cultivated orchards have yielded profits of from $400 to $1000 an acre on irrigated lands in both Washington and Oregon, almost within sight of the Umatilla Project. It has been demonstrated that English walnuts and almonds thrive and produce heavily there and they will be planted extensively. Big returns are secured from these trees wherever they can be grown well. Small fruits and berries flourish and reach the earliest markets, the growers getting advantage of the highest prices.

Fruit Raising in the Future.

Fruit raising has not been gone into extensively up to the present time because of the large individual and land holdings, but where any attention has been given to it, all trees have yielded regularly and abundantly, especially peaches and cherries. Now that all the land must be cut up into small tracts many orchards will be set out and it is expected that within a few years large fruit shipments will be made each year from Hermiston.

Alfalfa, beef and wool have been the principal products of the Umatilla Valley up to the present time. The gold medal given at the St. Louis World's Exposition for the best alfalfa was captured by this district. It was awarded to F. B. Van Cleve for alfalfa grown under the government diversion dam on the Umatilla River.

From 8000 to 10,000 head of fat steers are shipped from this valley every year, being fed and fattened entirely on alfalfa raised on Butter Creek and in the Umatilla Valley. It is estimated that 50,000 tons of this hay are produced there annually.

The markets are so advantageous under this project and the results from fruits so encouraging that it is the intention to specialize on orchard products and divide the land into very small holdings. It is possible to make good money from five acres with a full bearing orchard upon it.

Ample notice of the opening of the Umatilla Project will be given and settlers will be enabled to make improvements before the water is turned on. They must understand of course that they must agree to purchase water with the land. Those that settle upon this tract will be enabled to carry themselves along at the start by working for the contractors or the government engineers, if they wish employment.

The close settling of the tract will make social conditions equal to those of a city. Neighbors will be almost within stone's throw of each other. There will be good schools, churches of the several denominations and libraries.

Private Lands Reasonable in Price.

Lands can be bought now from private owners in various sized plats, from a town lot to a quarter section, at prices varying according to location. Agricultural lands run from about $50 up. This is distinct from the cost of the water right. The ten annual payments, without interest, for the water are made to the Water Users' Association, of which the landowners themselves are the members, and by it paid to the government.

Cost of preparing the land depends upon its surface condition. Taking the brush off may cost from $2 to $6 an acre, surfacing $10 to $30 an acre, and fencing from $100 to $300 a mile—enough for a forty-acre tract. The fence should be rabbit-proof for the first year at least. Lumber and other building material are reasonable in price, and implements nearly as cheap as in Eastern

States. Nearly all the work of preparation can be done by the settler himself.

The farmers do not even have to build laterals to bring water to their lands. The government does all this. When the settlers become the owners of the water they will have to maintain the works. The expense of this will be only about $1 an acre per year.

Hermiston is a Growing City.

The parties interested in the settlement of the Umatilla Valley lands want the units to be taken by citizens with ambition to establish homes and form a community of progressive, energetic, thrifty people that will make of this one of the fairest and most prosperous regions of the West, which it is capable of being made. The speculator, who has no desire to upbuild, but only to make profit for himself, is not encouraged. The idler will have no place there. Men experienced in agriculture and horticulture, or who are willing to learn the art, are wanted. None will find orchards and vineyards waiting for him. The land is undeveloped and therein lies the homeseekers' opportunity. There will be hard work and some discouragements, but success will come.

Land titles are beyond disputes. The government has made them secure.

Hermiston itself offers splendid opportunities for the merchant, manufacturer and investor. Being the central point of the Umatilla Project, it is bound to grow, and is already going ahead rapidly. The roads to all parts of the tract radiate from it. The city has fine streets, pure water supply, two good hotels, two banks, stores, handsome residences, school system, churches. It is only a year old. Realty values are advancing all the time and much money is being made by investors.

By writing to the Umatilla River Water Users' Association, the intending settler will receive the fullest information about this region.

California Leads in Irrigation.

California leads all the other states in the area of irrigated land, having 1,500,000 acres under canal systems. Of this, the great bulk, 840,000 acres lies in the San Joaquin valley, which has always been the greatest region for irrigation enterprise in the West. Private corporations have covered great tracts in Merced, Tulare, Kern, Kings, Madera and other counties in this valley which are mentioned in this publication. The settlement at Anaheim by Germans from San Francisco that practiced irrigation was made soon after the beginning of irrigation by the Mormons at Salt Lake. There are several million acres that can be watered in this state.

A Great Shoe Manufacturer.

Milwaukee can be proud to be the home of the Mayer Boot and Shoe Company. Next to the fame of Milwaukee's great breweries comes the country-wide reputation of Mayer boots and shoes. Mayer shoes have won their reputation on quality. The Mayer Boot and Shoe Company has persistently refused to lower quality to enable it to sell shoes at a lower price, and by maintaining this honest and superior quality and keeping in the front ranks in style, it has gradually won the confidence of thousands of shoe wearers who purchase Mayer-made shoes year after year—who look at the Mayer trade-mark as positive evidence of style, comfort, and good wearing quality.

This quality policy so consistently pursued has resulted in healthful and rapid growth. In the twenty-five years since the Mayer Shoe Company began operations it has outgrown six factories. And in the last six months, during which the last factory annex in Milwaukee has been building, the volume of business has so greatly increased that even with this new annex the output lags far behind the demand.

Including the new Seattle factory, which has just been completed, the total capacity of the Mayer Boot and Shoe Company exceeds 9000 pairs a day. This remarkable output together with the inability of the Mayer Company to build factories fast enough to keep pace with the demand, is most convincing evidence of the high quality of Mayer footwear.

In the first place the Mayer shoes are sensible. While good style is an important factor, comfort is always a greater consideration; while conspicuous extremes are avoided, refined dressiness is always secured. The exceptional durability and splendid wearing quality of Mayer shoes are due to the use of only the best leather and the employment of only the most experienced and skillful workmen. From the wide range of styles you are certain to find one which pleases. The best known brands are the "Honorbilt" fine shoes for men; the "Leading Lady" fine shoes; the "Martha Washington" Comfort Shoes; "Special Merit" school shoes, and the "Yerma" cushion shoes. If you want a dress shoe, a work shoe, or a shoe dressy enough for general use, yet sturdy enough for rough usage, it is our belief that you can't do better than to ask your dealer to supply you with one of the Mayer brands.

Celebrated Sweetwater Dam.

The Sweetwater Dam, across the mouth of a canyon a little way above National City, in San Diego county, has been a work of much interest to irrigators ever since its construction. The dam, constructed as a crown arch, is the largest of its kind in the world. It is of granite and Portland cement. It is 76 feet long at the base, 396 feet at the top and 90 feet high at bedrock. The reservoir covers 700 acres and has a storage capacity of six billion gallons. The reservoir serves 10,000 acres. This was an expensive piece of work, but the land reclaimed was very productive and semi-tropical fruits of great value could be produced in that climate.

Dr. Elwood Mead Goes to Australia.

The United States has lost the services of Prof. Elwood Mead, chief of irrigation and drainage investigations of the United States Department of Agriculture, who has rendered such signal service in testing soils under the various irrigation projects and deciding upon their adaptability for certain crops. Dr. Mead sailed last month for Australia, where he will take a high position under the government there as a soil and agricultural expert. His headquarters of late had been at Berkeley, where much valuable work was done by him.

Some breeders have discovered a new way of inducing hens to exercise, and at the same time providing food which is relished by them. Newly turned pieces of sod, about a foot square, are thrown into the poultry yard, dirt uppermost. Into this dirt is thrown oats, wheat, or small seeds, and the whole is then lightly sprinkled with water.

This is done preferably after the fowls have gone to roost for the night. It will be found that in the morning they will forsake their other food for these upturned sods, scratching them to pieces to get at the buried grain. The tender roots and grass contained in the sod will also be devoured to the last shred.

The Tradesman's Song.

Dollars and dimes, dollars and dimes!
I've counted them over a million times;
Till my brain is weary, my heart is sick,
With memories thronging, thronging thick,
Of a low brown house and a field of clover,
With the bubbling bobolinks caroling over,
Where the droning honey bee breakfasts and sups
In the sunshiny gleam of the buttercups.

Gold, gold, silver and gold!
What are they worth when all is told?
Only enough to eat and to wear,
And a shelter that shields not from worry and care!
Oh, to flee from it all for a day in the clover!
To hear the bobolinks caroling over!
With the droning bees to breakfast and sup!
And, ah, for the gold of a buttercup!

—Emma C. Dowd.

Cleaning Italian Wheat.

Consul A. H. Michelson of Turin reports as follows on the methods of ridding wheat of impurities in Italy:

Garlic (wild onion) exists as an impurity in wheat throughout Northern Italy. In the south it appears but rarely on account of the drier climate. In the north it is most prevalent in the consular district of Piedmont, and in very wet seasons it is occasionally found in quantities above one-fourth of 1 per cent of the wheat by weight. It flourishes chiefly in May and June, and as these are the months when wheat is harvested—in the south in May, in the north in June—its presence causes real damage.

No machine for cleaning wheat from garlic seems to be known here. In general, fitch, garlic and other impurities are got rid of at the same time by screens, fans and other methods for general cleaning. Wheat for sowing is usually more carefully cleaned than that for millers, and is sometimes treated with water.

In wet seasons millers complain seriously of the quantities of garlic in the Italian wheat they buy and have been known to import wheat to avoid the impurity. Nearly all millers clean their wheat themselves, but they do so only in the general manner set forth. A good machine which will separate wheat from garlic would be highly appreciated. Millers would undoubtedly use it, even if somewhat high in price. For the use of farmers such a machine would have to be hand driven and sold at a reasonable price.

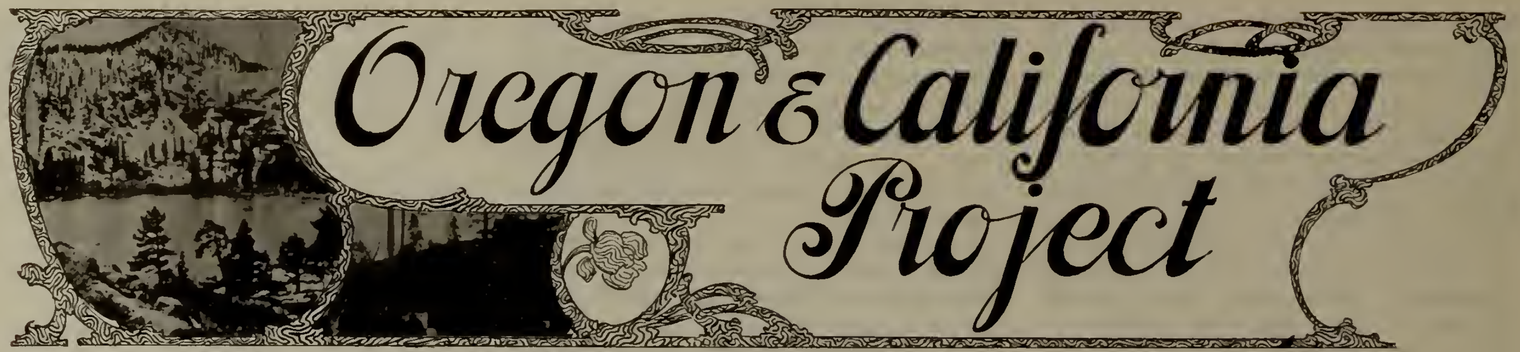
About Ducks.

A sandy soil is best suited for the ducks. They, like geese, make their own nests.

Ducks' eggs over a week old rarely hatch well.

When hatching duck eggs under hens, the young should be removed as soon as dry, as they become restless, and the hen often in her excitement treads on them.

Hens do not make good mothers, as they are more of a roaming disposition, and the ducklings, being weak in the legs, can not keep up this activity, and in consequence the young die from exhaustion.



Oregon & California Project

Lakes are Emptied to Make New Lands at Klamath

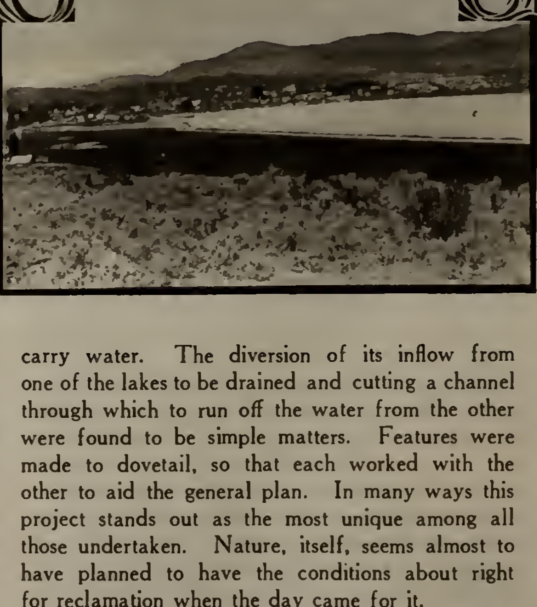
GREAT PROJECT IN PICTURESQUE REGION ON BORDER OF CALIFORNIA AND OREGON THAT IS TO REDEEM MANY THOUSAND ACRES IS FULL OF UNIQUE FEATURES

A REGION on the borderland of California and Oregon, where encircling mountains, primeval forests, glittering lakes, spectacular falls, far-stretching meadows, boiling springs and foam-dashed rivers all lend aid toward the making of a landscape of unusual delights, is the setting of one of the largest reclamation schemes in point of acres to be redeemed, and one of the most unique in various features, that have been essayed by the government. Known as the Klamath Project, because that name attaches to two of the lakes and a river that are within its area, this system will eventually embrace 220,000 acres and involve both the carrying of water to lands and their rescue from it.

1—Southern Pacific line from Weed, Cal., to Klamath that is being completed.

2—Excavation in main canal, Div. 2.

3—Sink River, Klamath Falls, Oregon.



4—View showing part of Lake Euwana, Oregon, with the town of Klamath Falls on the northwest end of the lake.

The Klamath Project, which, while it does not have among its features works equal to some of the colossal ones that characterize certain projects in the more arid regions, where mammoth dams are rising and far-spreading reservoirs are to lie, is replete with more than ordinary engineering exploits. The men of the service are taking hold of the drainage problem under this scheme. The work in hand contemplates the removing of water from two large mountain lakes—in fact emptying one of them and making fruitful farms of the lands now submerged by them. There will be dams that would not be small, were it not for comparison with others that the Service is constructing elsewhere, and the canal system will be an extended one, with a total of 439 miles of main canal, branches and laterals. Water is on some of the land this year.

The engineers on this project have had several advantageous natural conditions that relieved them of a great many knotty problems usually encountered in establishing an irrigation system in mountainous country. They have taken advantage of everyone of them. There was a lake that furnished a natural reservoir and a river from it to carry water. The diversion of its inflow from one of the lakes to be drained and cutting a channel through which to run off the water from the other were found to be simple matters. Features were made to dovetail, so that each worked with the other to aid the general plan. In many ways this project stands out as the most unique among all those undertaken. Nature, itself, seems almost to have planned to have the conditions about right for reclamation when the day came for it.

Because of all the advantageous features and the large area of land that can be reclaimed, the price per acre for water rights under this project will be the lowest of any—probably about $20 an acre.

Legislation by States Aided Project.

Legislation by the States of Oregon and California under which the beds of the two lakes to be drained were given to the United States Government, so that it might have full control of them for reclamation purposes, was passed expeditiously. In this state Governor Pardee, who took a strong interest in irrigation matters, watched the measure personally and saw that there was no delay in passing it. Oregon's executive was equally alert. The waters of these lakes were navigable and Congress passed a measure permitting their navigability to be destroyed. All this was accomplished without friction and the first step of importance had been taken.

The Klamath Project is located in what is known as the Klamath Basin, in Klamath County, Ore., and Modoc and Siskiyou Counties in California. The territory covered by the system planned embraces the upper Klamath lake in Oregon, Clear Lake in California, Tule Lake, a small portion of which is in Oregon, but the major area in California, and the Lower Klamath Lake, which consists of two areas of water that resemble in conformity an hour glass, the upper, and smaller area lying mostly in Oregon and the other entirely in California.

This system of irrigation is divided by the natural arrangement of water bodies and areas to be watered into two distinct sections—the Upper and the Lower projects. The Upper is to reclaim what is known as the Lost River Valley, but which really consists of a chain of four valleys, the Upper Poe, Langell, Yonna and Upper Klamath. There are 50,000 acres in this section.

The Lower project provides for the watering of lands in Klamath and Lower Poe Valleys, the part drainage of Lower Klamath Lake and its marsh borders, and the emptying of the cup that forms Tule Lake. The government land will be the portions of the beds of these lakes that are to be uncovered and will equal about 23 per cent of the whole, or more than 50,000 acres. It is expected that this land will be very rich. Though it has already been tested around the edges of the lakes, it will furnish the mystery feature of the project and the revealing of it will be awaited with expectancy. Upon the land from which this submerging body of water is taken, a flow will be carried under the restraint of ditches and green fields will gradually cover the expanse the crystal surfaces now hide.

Mysterious Windings of Lost River.

Lost River is appropriately named. Perhaps its appellation is a translation from Indian nomenclature, for it seems as if Indian imagination had created the name that so well fits this weird stream. Six miles to the east of Tule Lake, well down in Modoc County, California, sits Clear Lake, 4523 feet above the sea level, a little less than 500 feet higher than the other lakes of the region and from 100 to 500 feet higher than most of the land to be irrigated. In this lake Lost River has its source. From there it wanders, like a child picking its frightened way through a wood, in a northerly and then in a westerly direction, with many windings, as if trying to find a passage way to the ocean, that is the goal of most rivers, and finally gives up its quest and flows helplessly south again, and almost back home, emptying into Tule Lake.

1.--View showing Adams Canal, looking east 2½ miles north of Merrill, Ore., Klamath Project. 3.--View looking east up the Klamath River from a point 3½ miles east of Keno, Ore., showing Tule and swamp lands to be drained and reclaimed. 2.--View looking southwest up the Langell Valley, 4 miles west of Lorella, showing irrigable lands.

But even this bewildered river, that fails to make the broad flight of other streams, has found its mission. From it in the main, the lands of the upper part of the Klamath basin are to be watered. Clear Lake, its source, will form a natural reservoir, with the construction of a dam across Lost River, two miles below its junction with Willow Creek at the outer edge of the marsh lands. The capacity of this reservoir will be 462,356 acre feet.

Miller Creek will be an aid to Lost River in supplying water. This creek is rather an important stream that rises to the northeast of Clear Lake and flows southwesterly into Lost River. At its headwaters in the meadows a dam will be built to create a reservoir of 157,865 acre feet capacity. This will be known as the Horsefly Reservoir and will be used as an auxiliary.

The Clear Lake dam is 850 feet long, thirty feet high and twenty feet wide at the top. The Horsefly dam is only 480 feet long, but is seventy feet high. Its width on the top is also twenty feet. As there are no torrential streams to be held in check by these structures, they will be of earth and rock.

Upper Klamath Lake not to Be Destroyed.

For the Lower division of this project water is to be taken from the Upper Klamath Lake, which lies at the northwestern corner of the basin. A few miles below it is a smaller lake, Euwana. This and Upper Klamath Lake are connected by Link River and then from the smaller lake flows the important Klamath River, which winds south and then west and pours into the Pacific Ocean, 4100 feet below the elevation of its source. Upper Klamath Lake has an area of 80,000 acres. It will not be destroyed. Its elevation is 4142 feet above sea level. The diversion point for the main canal is only one mile above the town of Klamath Falls, the principal one in the Basin. A canal will run from each side of Link river, and work on them is nearing completion. The main canal has a capacity of 1500 feet per second. Of the first nine miles, to Olene, 3300 feet is in tunnel, built to tap Link river, and 2700 feet is cement-lined. The rest is in an open cut in earth—pretty easy canal building for such a big project. This larger canal runs eastwardly. At its lower end it is forty-five feet wide on the bottom and sixty feet on the top and six feet deep.

The East Branch canal, with a maximum capacity of 261 second feet runs from the terminus of the first unit of the main canal to a point near Merrill, a distance of nineteen miles. The lateral system of the main canal's initial unit was built by the government itself. The Klamath Falls Irrigation Company had already established a system on part of the land under it, and it was believed the Service could do the work with less interference with the farmers.

The main canal and the East branch have a total length of fifty miles. The other branches will have a length of fifty-two miles and the laterals will total 160 miles.

Tule Lake is expected to empty itself by evaporation and through an underground outlet it is believed to have, after its one source of supply, Lost River, has been diverted from it. The engineers in charge of the Service have noted that while the loss from evaporation from this lake, which has no surface outlet, is about thirty-eight inches, records of rainfall, inflow, and variations in its height, indicate a loss from its surface of about sixty inches; and then despite the fact that no surface outlet exists. Tule Lake is of fresh water. The formation of the country is volcanic and the rocks show great fissures. To the southwest, many springs exist, which also shows that an underground passage may exist. The drying of the lake will solve the mystery.

States Yield Title to Lake Beds.

With Tule Lake disposed of easily by the natural consequence of taking away its old companion, Lost River, the Lower Klamath is to be considered, and here too the problem was very simple. A natural dike or ledge of basalt maintains the level of the latter lake. This ledge extends across the Klamath River near Keno. A cut nine feet deep was planned by the engineers and through this most of the waters of the Lower Klamath will be carried into the Klamath River. Though nine feet is not a very deep cut, it will be sufficient to expose a large area of land over which the water is shallow and much of which, in fact, is merely marsh land. Canals from the Upper Klamath will cover the exposed area of the lower lake.

There is no rush to locate the public lands under this project for the very good reason that they are still under water. Some effort at location around the edges of the lakes was made. As they have passed the title of the lake beds to the United States, Oregon and California entertain no applications for the acquirement of lands within them. Before the act making the grant to the government was passed, application had been made to the State of California for the purchase of all the lands under the Lower Klamath and Tule Lakes within that state, but with a few unimportant exceptions none of these applications were perfected, as surveys could not be made.

Soil investigations in the Basin show that nearly all the land is of a character to insure good results when properly irrigated and tilled. All the uplands are reported to be quite free from alkali. "Decomposed basalt" is given as the general character of the soil on the higher lands. That in the lakes will probably be more of a vegetable nature. Alfalfa and sugar beets will be important crops. The climate is good, with a maximum temperature of 105 degrees and 26 degrees minimum, but the growing season, owing to the altitude and frosts will be rather short. Two cuttings of alfalfa are usual. Grains, vegetables and hardy fruits will thrive. The lake beds will offer fine fields for the production of garden truck, tests having shown them well adapted for celery, asparagus and potatoes. The average yearly rainfall is fifteen inches.

Part of the lands near Merrill, along the northwestern shore of Tule Lake, which are under irrigation, are showing accumulations of alkali because of insufficient drainage. Surveys for the rectification of the evil are being made.

8000 Acres Already Furnished With Water.

Canals have been constructed to date covering approximately 20,000 acres, including the main headworks, a 3100 foot tunnel and about ten miles of the main canal which has a capacity of 1500 second feet. Work is under way on the headworks of the Keno canal and further extensions of the main canal; plans and specifications are being prepared for the Clear Lake dam and other structures. The work thus far done involves an expenditure of nearly $1,500,000. Water is being furnished to about 8000 acres this season.

This is what a landowner deeply interested in the Klamath region has to say about the project. His remarks contain some valuable hints for settlers:

"The most serious difficulty which has arisen is the lack of preparation of the land for the water. Much of the land, and especially that under the first section of the main canal, is owned in large tracts. Our present isolation and lack of railroad transportation and remoteness from the great farming communities east, upon which we must depend largely for tillers of the soil, has been against the subdivision and settlement of these lands. These same conditions have tended to bring in more speculators than homemakers. Another retarding factor is the lack of experience of the right kind among the old settlers in irrigating and intensive farming The engineering features are simple, and we have all the natural elements to combine into a splendid system, but the human factor is more complex, requiring time to adjust. The most important thing of all is to get actual homemakers on the land. With the advent of the railroad, a matter of a short time now, we expect a large influx of this class of people. My particular advice to such is to secure a comparatively small tract, make the best preparation for the water, and cultivate it intensively. A little land well tilled is better than all out of doors devoted to sagebrush."

A large force of men is now employed on the extension of the California and Northwestern railroad from Weed to Klamath Falls. It is believed that boat connection will be made within a few months. The contract for building the entire distance to Klamath Falls has been let, and the work will be pushed as rapidly as the unsatisfactory labor conditions will permit. There is work for everybody at Klamath, it is said.

Splendid Spirit of Progressiveness Shown.

Farm units under this project will be eighty acres. The private land is held at from $10 to $50 an acre.

The total cost of the project is estimated at $4,400,000. The survey was begun in June, 1904. The contracts for the construction of the first portion of the main canal were let in February, 1906, and work was begun the following March. The project will probably be completed next year. The government is in full control of all the water rights and nearly all the private lands have been signed over, to be disposed of under the terms of the Reclamation Act. The citizens of Klamath Basin have shown a spirit of splendid progressiveness and have co-operated with the government from the start to bring about the consummation of this splendid project.

The town of Klamath has 3500 people and is advancing fast. The Southern Pacific will soon have a line from Weed, in California, through this town, over which it will run its overland trains to and from Portland. Klamath is 451 miles from San Francisco and 443 miles from Portland. Other railroads are contemplating building to it.

Special features of the beautiful scenery at this place are the Klamath Falls and the famous Crater Lake. There is unusually fine hunting and fishing in the region and sportsmen are finding their way to it. The Basin is about 150 miles east of the Pacific Coast, between the Cascade mountains and the main range of the Rockies.

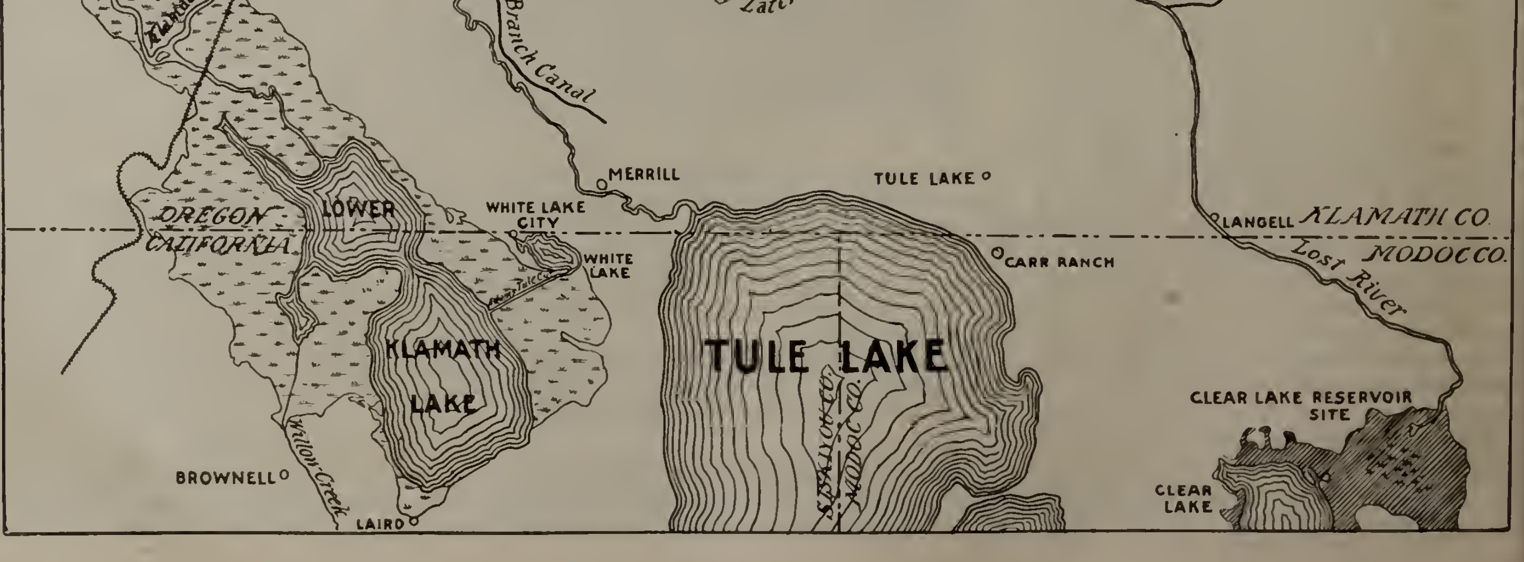
Timber and live stock resources in this region are very extensive.

Cotton Crop in Burma.

Consul-General W. H. Michael, of Calcutta, quotes an official report which says that the total estimated area under cotton in the 16 cotton-growing districts in Burma for this year embraces 189,213 acres, which is an increase of 2705 acres over the actual area planted to cotton in those districts last year. In some of the districts the increase is due to favorable rains, while decrease in others is due to the substitution of groundnuts for cotton; late rains and drought over very small districts also caused decreases. On an average, during five years ending 1905-06, the area planted to cotton in Burma represented 0.9 per cent of the total area under cotton in British India.

Foreign Apples in Great Britain.

A report from Consul F. W. Mahin, at Nottingham, states that official figures show that Great Britain's annual import of apples is now nearly 9,000,000 bushels. One-half the import is from the United States. The total from all the British possessions is under 4,000,000 bushels; Canada's share is about 3,000,000, and Australasia's nearly 500,000. The import from all foreign countries other than the United States is therefore small. The favorite apples in the British market are certain kinds from the United States, but it is believed here that the entire demand for imported apples could be met by Canada and Australasia.



SOUTH DAKOTA PROJECT

Engineers Find Belle Fourche Country a Virgin Project

NO PRIOR RIGHTS TO WATERS OF RIVERS EXISTED AND FULLY HALF OF THE LAND TO BE RECLAIMED BELONGED TO THE UNITED STATES

SOUTH Dakota is to have one of the largest of the several greater irrigation systems projected as its initial undertaking by the Reclamation Service. Under an earthen reservoir dam, 6,200 feet long on the top and 115 feet high, giving a storage capacity of 203,770 acre feet, 100,000 acres of land are to be watered. This land lies in Butte and Mead Counties, and the town of Belle Fourche is ten miles from the dam. The project is adjacent to what is known throughout America as the "richest 100 square miles on earth"—the gold mining region of the Black Hills. It is expected that the settlers will find a large market for hay and other products in this mining territory.

Fully half of the area under this project consists of government land. Much of that privately owned can be purchased at $10 an acre. The government engineers place the prospective value of improved irrigated land under this project at $60 to $80 an acre.

It was virtually a virgin project that the Reclamation Service found waiting its attention at Belle Fourche. To the annual 400,000 acre feet run-off of the Belle Fourche river, from which the main supply of water is to be taken, there were no prior rights; the percentage of land owned by the government there was above the average; no irrigation, except a little along the creeks, has previously been attempted. The Reclamation Engineers were welcomed gladly and given all encouragement.

It will be noted that this dam at Belle Fourche will be more than one mile in length. Look at something that you know is a mile and about a fifth away and you will get an idea how long it is. It will be the largest earth dam in the United States. The bulk of the material that will go into it will be clay of the peculiar sort known as "gumbo" which is usually the despair of the farmer, for he says that "when it is dry he can not do anything with it, and when it is wet, it is worse." It makes excellent material for a dam though, when it is tamped down. The dam is to be 500 feet thick at the bottom, 63 feet at the highest water line and twenty feet at the top.

Diversion dam, Belle Fourche Project, showing gap through which river is flowing.

Will Present Wall of Green.

The inner part of this structure will be faced with concrete slabs, weighing 3,000 pounds each. The slope on the outside, that has a fully exposed height of 115 feet, will be fertilized and sown to grass. This will make one of the most picturesque sights of all the reclamation works—a wall of green more than a mile long and 115 feet high. Across the top of the dam will be a wide wagon road lined with trees, a fitting highway for a King to take his daily drive upon and look down upon his possessions. In this democratic country no king will ever roll in his chariot across the Belle Fourche dam, though, unless he comes visiting and behaves himself so well that he is given an invitation to ride across this embankment.

At the deepest point, the water in the artificial lake to be created will be 100 feet in depth and the average will be thirty feet. The reservoir will cover thirteen square miles and will have a shore line of about fifty miles.

The water to fill this immense cup that is to pour liquid life over the many farms will come mainly from the Belle Fourche and Red Water rivers, but Owl, Crow and Indian Horse Creeks, which drain large sections of territory and come rushing into the larger streams with full buckets during the spring freshets, will help largely. The Red Water really joins the other river several miles above the dam, so the Belle Fourche receives all the credit in official records of filling the big pond.

There was no reservoir site on the Belle Fourche, but the matter of turning the waters of a big river so they can be led to some suitable reservoir site that has been selected has become a small matter to the men of this service. The engineers found a site in Owl creek, ten miles northeast of Belle Fourche. To turn the waters so they could be led to this, a concrete diversion dam 400 feet long was constructed. It is in the form of an overflow weir and provided with sluice gates adjacent to the regular gates. Floods of 20,000 second feet can pass over this weir. The diversion dam is rooted into a slate, or shale formation, which has been shown to preserve its integrity to a great depth. An earthern wing dam connected with the overflow weir was extended across the valley, opposite the canal heading, to cut off any flood flow encountered. The regulator piers and walls are founded on the slate and built of concrete. The lake created by the diversion dam will cover 170 acres. There will be no storage of water in it.

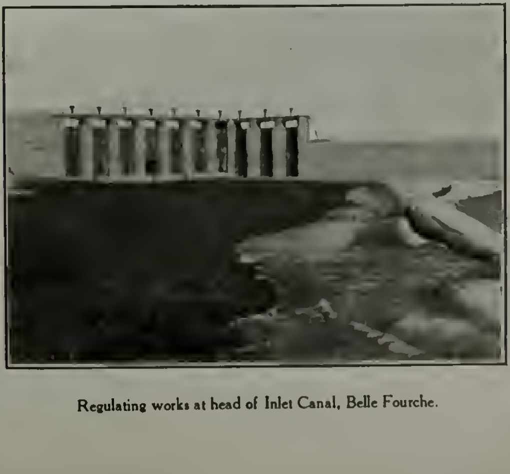
Precautions Against Winter Freeze.

The supply canal that will carry the Belle Fourche waters from the weir to the reservoir is six and one-half miles long. It is forty feet wide on the bottom and will carry a flow ten feet deep. Its capacity is 1,635 second feet.

The waters of Crow creek are gathered in by the supply canal about half a mile below its head. It carries each year a large amount of unappropriated water that can be utilized for storage. The canal has been given the power to protect itself from floods in the creek. A concrete overflow weir 180 feet long has been constructed on the lower bank and this will spill the waters over automatically when the canal is full.

The supply canal will broaden at its reservoir end and, to prevent a washing away of the bank of the big artificial lake, will pour its water gently in a two-foot sheet over a 180-foot, semicircular weir. This is the method used for protecting reservoir banks from the force of the streams of water discharged into them. A torrent loses strength when it is broadened and concentration taken away from it.

Storage must be depended upon entirely in



Regulating works at head of Inlet Canal, Belle Fourche.

this valley because of the light summer flow of the streams. The spring flow is heavy. The engineers aimed to build works at the outset that would store enough water at one time for all the irrigable lands. The reservoir will have a capacity sufficient to give each acre of land under it eighteen inches of water each season, just when it is needed, and allow 25 per cent for seepage and evaporation.

The veneer of concrete slabs on the inner slope of the big dam will be put there to protect it from wash and ice action, for it must be remembered that there is a heavy freeze in the winter in this region. These slabs will be 6x4 in surface dimensions and eight inches thick. They will be laid with open joints, and behind them, acting as a drain, will be two feet of screened gravel. Besides the grass on the outer slope, there will be concrete gutters to carry off the rainfall and prevent erosion. The "gumbo" that will form the body of the dam, will be put on in layers, each of which will be wet down and made solid with a steam roller, and the whole will be of great compactness.

Tearing up earth

Bids for constructing the supply canal and diversion dam were opened in April, 1905, and for the reservoir dam in October. For the former the amount was close to $100,000 and for the latter near $1,000,000. Work has progressed steadily since the letting of the contracts. The estimated total cost is $3,300,000. Water will probably be turned on in September, 1909.

Lands Have Been Divided.

There will be 100 miles of distributing canals under this system, fifty-seven miles on the north of Belle Fourche river and east of Owl creek, and forty-three on the south of the river and between Owl creek and the river on the north side.

The irrigable lands under this project have been mapped and divided into units and they are already being taken up. Much of the lands in private ownership is along the creek bottoms and has produced heavy crops from overflow watering. The principal crops of this region are alfalfa, grain, hardy fruits, sugar beets and potatoes.

Railroad over Canal.

The farm unit under this project is eighty acres, beyond two miles of any town, and forty acres inside the two-mile limit. It is guaranteed that the price of the water right will not be more than $34 an acre.

There are two distinct classes of soils there—the light sandy loam on the south side and the heavy clay or "gumbo" on the north. The latter has been a vexation to the average farmer, but the government experts say that with water in complete control, making it possible to keep the gumbo at a proper moisture, it will become one of the most valuable of lands. It is rich in plant food. The settlers are warned against using an excess of water on the land. The soil is free from gravel or rocks. There is very little alkali on the surface and no indication at all of black alkali. The experts of the service pronounce all the land reached by the canal plan as "good."

Grazing Land May be Taken.

There is a great deal of government land surrounding the tract and those that have farms on the edges of the latter may locate enough of this to make up a quarter section. All the first-class land under the project has a slope of but five per cent, which makes it easy of irrigation. What is called third-class land has a slope reaching 10 per cent in some cases and is much harder to serve with water.

RAYMOND F. WALTER
Engineer in charge Belle Fourche Project

The range of temperature at Belle Fourche is from 100 degrees in summer to 30 below zero in winter. The rainfall is from 14 to 19 inches. The elevation is from 2,600 to 3,000 feet.

It was at first intended to bring the waters of the Little Missouri to the Belle Fourche project, but a sufficient supply was developed without this. The Little Missouri will probably be used for other projects in this state, of which there are several other feasible ones. It is thought that the irrigable area may be increased from the 20,000 acres of today to 300,000 acres.

Ash and Grit for Growing Chicks.

Man in fifteen, eighteen or twenty years, may multiply his birth weight by twenty; the calf weighing from fifty to seventy-five pounds may in three years become the cow, bull or steer of from 900 to 1000 pounds; but the chick in ten weeks often shows a gain of 1500 per cent, and ducklings may add from 50 to 100 per cent of their weight weekly. And this growth is not of flesh, fat or soft tissue merely; for the extensive, strong, bony framework must be formed with equal rapidity. Something like 10 per cent of the body of the average fowl would be made up of inorganic (mineral) bone elements or "ash," and the percentage must be much greater in those lean, immature birds. The ordinary grains will not supply this ash in any such proportion.

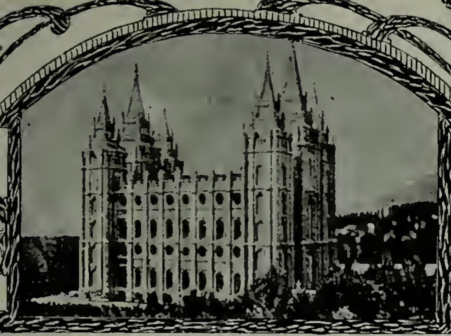
In digestion experiments with other animals, ash is usually less completely digested than the other nutrients. Thus we must force the fowl to eat large quantities of food in order to get the amount of ash needed, or we must provide some richer source of mineral element than grains. If the bone-making material is not abundant one or two things will happen: The bones will be large, soft and weak, resulting in lameness or deformity; or the development of the bird will be governed by the mineral elements and will thus be retarded, making growth slow and unsatisfactory. Such a check in growth can rarely be overcome; just as it is almost impossible to restore the full flow of milk in a cow that has been starved to a marked shrinkage of production. The tests at the station proved that the chicks did as well when bone ash only was added to the purely grain rations, which were made palatable by being in great variety and by regular changes, as upon rations a part of which was animal food. In short, the "ash" element is the important factor in the good growth of the chicks.—Fruit Grower.

Effective Thanksgiving Table.

An effective table can be arranged for light refreshments for a Thanksgiving party by using a round table marking it off in as many "pieces of pie" as there are guests by drawing ribbons from the center, fastening them under the table, until the whole table has been apportioned off. Make a brown paper "crust" to place over the whole table, marking this off in sections also with the guests's name written in the sections. One guest at a time can be brought to the table, given a pair of scissors and told to "cut the pie" cutting out the paper at the lines indicated about her name. Underneath, of course, is the cover set with a pretty gift for each person.

Farm Wife and Mother.

In his recent address to the young students of the Agricultural College of Michigan President Roosevelt paid a tribute to the wife and mother of the farm. He extolled her patience, her fidelity to her children, her unselfish patriotism in hours of the nation's peril. "By the more or less isolated home life she leads," he said, "and the exacting nature of her manifold duties she stands somewhat separate from others. She is nothing if not self-sacrificing, heroic in all the emergencies that confront the tiller of the soil."



UTAH PROJECT

Towering Rim of Great Basin Being Pierced with Tunnel

STRAWBERRY VALLEY WATERS TO BE IMPOUNDED AND CARRIED THROUGH CLOUD-CAPPED MOUNTAIN FOR FERTILE VALLEY FAR BELOW BY LONG BORE UNDER WAY

Up in the clouds, in one of the most picturesque parts of Utah, the Reclamation Service is piercing the rim of the Great Basin with a tunnel to let water in and carry it down to the valley land in the vicinity of Utah Lake.

This is known as the Strawberry Valley Project, for this valley over the big mountain is to store the water that will be utilized. This water has been cut off from the farmers of the fertile section in the Basin by that forbidding rim that was too great an obstacle for them to overcome.

Grading camp on power canal, Strawberry Valley project.

The Strawberry tunnel, which is second only to the giant bore being made from the brink of the Gunnison river, is under construction. It is being driven through a mountain in the Wasatch range, 9000 feet high, at an elevation of 7500 feet above the sea. In the summer time the work is carried on without particular difficulty, but in the winter the storms are heavy at this height and the snow is driven about on the blast and settles deeply on the mountains, rendering operations extremely difficult.

It will be three or four years before this tunnel is completed, as it can be driven from the two ends only. The depth from the top of the mountain to the line of the tunnel is so great that shafts cannot be sunk profitably to form intermediate headings. The tunnel will be 18,000 feet long—about three and a half miles. Inside the lining, which will be of concrete, it is approximately sixty square feet in area, or six and one-half by seven and one-half feet, with an arched roof and of 500-second feet capacity. There is now excavated and timbered at the lower end about 1,500 feet, but work on the tunnel has been stopped until the power plant is completed. The canal for this plant is nearly all excavated and the plant will probably be ready for operation by the first of next year.

Towering Rim Stays Work of Farmer

About 60,000 acres of land, of which Payson is the central city, are to be watered from the government project here, including 25,000 acres already under private ditch and securing a rather inadequate supply from the streams in the valley, the waters of which run off in from thirty to fifty days in the spring, there being no sites for storage reservoirs to hold them. Pumping and drainage will reclaim about 10,000 acres.

To provide storage for the water of the Strawberry river and Indian creek, flowing into Strawberry valley, within the drainage of the Colorado, which is going to waste in the Gulf of California, miles away, is the object of the present work of the government. The Strawberry rises far up in the Uinta mountains and, after flowing through the valley, drains into the Duchesne, thence into the Green river, and thence into the Colorado, flowing thence to the gulf and the sea, while fertile land is lying in need of it.

A dam forty-five feet high will be constructed across the river just where it starts out of the Strawberry valley, and the latter will become an impounding reservoir. This valley contains about 6,000 acres and will store 100,000 acre-feet of water. This supply will be augmented by the flow of the valley streams. Through the big tunnel the water of this reservoir will flow and then down the natural courses of Diamond creek and Spanish Fork, to a point near the mouth of the Spanish Fork canyon, twelve miles from Provo, where the offices of the Reclamation Service are located. At this point the water is picked up and carried three miles through a large canal. Then there is a large drop, where most of the flow will be made to generate power on its way to the irrigable area. Much of this will be watered from the new canal system, which will receive the waters of Spanish Fork while the tunnel is being driven.

Pumping and Drainage Planned.

The power will be conveyed a distance of thirty miles to the tunnel. It will be used in operating drills, running tramways and other work of construction there. Some of it will be used in

Heading in Strawberry Tunnel.

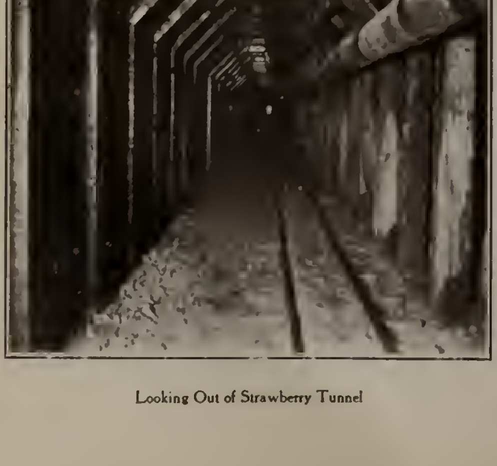
lighting adjacent towns and small quantities will be given farmers for use in agricultural purposes until the tunnel is finished and the water turned on, when the power will be used in pumping water from lowlands adjacent to Utah Lake to higher lands, thus reclaiming the lower lands contiguous to the lake by drainage and irrigating those on the benches immediately above them. A portion of the water will be carried past the power house and distributed to the dry lands at a higher elevation.

Strawberry Valley Project West Portal Camp

The Great Basin is really the bed of the old geological Lake Bonneville. The land in the upper part of the lake bed in this part of the Basin is extremely fertile and is thickly settled, this land being the first tilled by the Mormons when they arrived in 1847. In the lowest part of this valley is Utah Lake, which drains through a ridge into the great Salt Lake, also in the Basin, the stream formed being known as the Jordan river. Utah Lake, having an outlet, is fresh water, though the greater lake is salt.

Tunnel Entrance Strawberry Valley Project

The building of a road through the mountains over which to carry supplies and machinery to the tunnel site was one of the larger undertakings on this project. It was constructed the entire distance through very rough mountain country. It is thirty miles in length and runs from a point on the railroad in Spanish Fork canyon to both portals of the tunnel. All material has to be hauled over this road.



Looking Out of Strawberry Tunnel

West Portal and Power House, Strawberry Tunnel

The work of building the road was done almost entirely by men that belong to the Water Users' Association. With all its windings, a six-horse team may pass every curve. All but three miles passes through vacant public land that is so rough that it has little value except for grazing. It will be a great boon to the settlers in the western part of the Uinta reservation, giving them better access to Payson and other Utah markets.

Two lines of railroad cross the irrigated area.

Dreams of Great Tunnel to Come.

Years ago the idea of putting a dam across the gulch through which the water of the streams flowing into Strawberry valley escapes was conceived by farmers living there, but the towering rim of the Great Basin interposed itself. The plan, even then, was to make a great reservoir of this valley and bring the waters out on the west side. Surveys were made, but the high mountain, in which nature has made no cut, caused abandonment of the plan then. It was too much for private capital.

Five years ago State Senator Henry Gardner conceived the idea of tunneling through the mountain. Surveys were accordingly made and it was found that by digging a tunnel the valley could be tapped on the west side. Work was begun by a company of private citizens, who continued at it for one and one-half years. In 1903 the citizens of Payson held a mass meeting to consider the Strawberry valley water project. A committee of prominent men from both towns was appointed to

Inside of Power House, Strawberry Tunnel take the matter in hand. They appealed to the government for aid in 1904 and got the reclamation authorities interested. Surveys were made and the project found feasible. Application was made to the Secretary of the Interior for permission to locate a reservoir in Strawberry valley, which was permitted. From here the plan took definite form and the successful completion of the work was practically assured. The land owners of Payson and Spanish Fork have incorporated under the laws of the state of Utah with a capital stock of 50,000 shares at the par value of $40 per share. This will irrigate 50,000 acres of land. The stock was all taken up within seventy days after the corporation was effected. Overtures were again made to the government for support, with favorable results. A contract was executed by the Strawberry Valley Water Users' Association, signed, and forwarded to the chief engineer of the reclamation service to the effect that the government would take the work in hand and complete it.

Quinton the Tunnel Builder.

The cost of the Strawberry valley project will be about $2,000,000, and the cost for water rights will be from $30 to $40, nearer the latter sum, most likely. The land is all in private ownership, though much of it can be bought at very low figures and it will be very valuable, especially about Payson, when the water is turned on.

Supervising Engineer J. H. Quinton, who has jurisdiction over the reclamation work in Utah, Colorado, and Nevada, and thus of both the Strawberry and Gunnison tunnels, will become known as the tunnel builder of the service. Engineer J. L. Lytel is in charge of the Strawberry valley system as project engineer.

PAYSON, KEYSTONE CITY, BELOW STRAWBERRY VALLEY

SITUATED near the center of the State of Utah in the extreme southern end of her most beautiful and fertile valley, and nestling like a gem at the base of the mighty Wasatch mountains, is the prosperous city of Payson.

This city's population numbers about 3000. The comfortable homes, well tilled farms, numerous flocks and herds, and well-stocked business houses speak eloquently of the thrift and industry of this happy and prosperous community.

The wisdom and foresight of the founders of Payson are evidenced by its location, so favorable for the building up of a healthy and prosperous commonwealth, already abreast of the new era of progress and destined to become soon a center of importance in the agricultural and financial development of the great West.

1.--Haying Scene on John E. Huish's 400 acre Farm, Payson, Utah.

2.--Orchards and Farms near Payson, Utah. Village of Salem in the distance.

3.--Sugar Beet Farm, Payson, Utah

The early settlers now living contrast with pride the present achievements with the city's humble founding, on October 20, 1850. Here, 1,000 miles west of the western boundaries of civilization, and surrounded by and contending with nature in its wildest and least developed state, the pioneers, like many others of their kind, built their rude homes and began the tilling of the soil, then a sage-brush waste, inhabited only by the wily Redman, against the treachery of whom they were compelled to keep a constant vigil at a cost of means, energy and, at times, life itself. The broken soil upon which they diverted the limited water, trickling from springs in the mountains above them, gave promise of good crops, but disappointment followed when the growing grain was devoured by grasshoppers and crickets.

All Drawbacks are Overcome.

Notwithstanding all these and many other drawbacks incident to pioneer life, Providence eventually smiled upon their efforts, the town continued to grow, the population increased, business houses were established, school houses were erected, the water supply, which at first barely reached the town, was marvelously increased in volume until there was enough of it—nature's magic enchantress—to transform the arid desert into verdant fields and fruitful orchards.

From the disadvantages under which they established their colonies the settlers soon learned and early realized the advantages of co-operation and unity in business as well as social and other matters. One of the early results of this united effort was the diverting of the waters flowing from the mountain heights above and around them upon the parched sagebrush flats, through canals and ditches planned and builded by themselves, the success of which has since given the settlers of this State the proud title of "fathers and founders of irrigation." The importance of this artificial watering of land has grown and increased until today it is claiming not alone the attention of the people of this State but the entire West, and in fact the whole nation, as shown by the great Irrigation Congress, and by the recognition of its vast importance by the National Government in the passage of the Reclamation bill of 1902, which has already provided about $33,000,000 for the reclamation of arid lands.

That this money is being expended wisely and in a way that means much to the nation in general and the communities where expended in particular will be shown by a careful perusal of the contents of this special edition of Orchard and Farm, so ably and thoroughly illustrating this new, though highly important factor in the development of our country.

Among these great schemes and of more magnitude than anything of the kind before undertaken in Utah is the great Strawberry Valley project to supply water for irrigating the south end of the fertile Utah Valley.

This project will reclaim 25,000 acres of arid, though fertile lands, and supplement the present water supply intended for 25,000 acres more, besides redeeming 10,000 acres by drainage and pumping. The new land that will come under the canal is valued at $20 per acre now; when water can be had it will run from $100 to $125 per acre.

Heavy Crops Are Produced.

The Strawberry Valley water is taken out through a high line canal, extending about twenty-five miles along the foothills in a circuitous route, forming a semi-circle, enclosing the southern portion of Utah County. Situated as a keystone in the arch formed by the canal is Payson, geographically a natural center for the entire district. Much of the land is already under cultivation, producing excellent crops of wheat and alfalfa, and which, furnished with water for irrigation, will yield immense crops of cereals, vegetables and fruits. That the opportunities for home, business and agricultural investment may be better realized, a brief statement of the present status and future possibilities is here presented.

1---Residence of Joseph Wightman.
2---Presbyterian Church, Rev. John E. Nelson, Resident Pastor.
3---Main street, looking north, Payson, Utah.

4---Payson Exchange Savings Bank.
6---Residence of Joseph Reece.

At present there are about 4000 acres of irrigated and 6000 acres of other land under cultivation. The wheat crop of 1906 amounted to practically 60,000 bushels. Potatoes, noted throughout the West for quality, hay (alfalfa and meadow) and all other farm and garden products yield abundantly. Four hundred and fifty acres of land were devoted to sugar beet culture in 1906, resulting in an average yield of a little in excess of nineteen tons to the acre, and running high in saccharine matter and purity. With the advent of the Strawberry Valley water, thousands of acres of equally good land will be available for beet culture, affording an excellent opportunity for the establishing of a sugar refinery in the very heart of a district where a sufficient tonnage of beets of high quality can be produced to maintain it. Already inquiries have been received in regard to establishing such an enterprise at the proper time.

Fifty thousand head of sheep are owned by citizens of Payson and vicinity, the wool output amounting to 300,000 pounds.

It is estimated that during the year not less than half a million dollars of business has been transacted in Payson, the business interests being represented by two general merchandise stores, two dry goods establishments, two gents' furnishing goods stores, one tailoring establishment, three millinery stores, two furniture houses, one bank, one drug store, three hotels, one restaurant, two hardware stores, one harness and saddlery establishment, three implement stores, three coal agencies, two saloons, two barber shops, one confectionery store, two shoemakers' establishments, one photograph gallery, four meat markets and grocery stores, two tinning shops, one printing establishment, six blacksmith shops, one undertaking and embalming parlor and one lumber yard. There is also an opera house and a dancing pavilion. An excellent flouring mill site exists here, the mill having recently burned, affording a splendid inducement for investment in this line. There are two physicians.

Payson on Two Lines of Railroad.

Payson is located on two lines of railroad, the Denver and Rio Grande and the San Pedro, Los Angeles and Salt Lake (Salt Lake Route), recently completed and connecting the city directly with Los Angeles and the Pacific Coast.

There are three lodges, the Odd Fellows, the Woodmen and Royal Neighbors.

The churches represented are the Church of Jesus Christ of Latter Day Saints, the Methodist and the Presbyterian. The former is just completing a beautiful, commodious and imposing Stake Tabernacle at a cost of $20,000.

Education here, as elsewhere throughout the entire State, is of a high standard. The public schools employ fifteen teachers, eight of whom are located in the new Peteetneet school building, erected at a cost of $20,000, and second to none in the State. A high school, comprising two instructors and forty pupils, is an important factor in preparing students, after completing the district schools, for entrance to universities and colleges of the State and Nation.

In addition to the foregoing, denominational schools are maintained by the Presbyterian and Methodist Missions.

Payson is connected with the outside world by the Western Union telegraph line and two telephones, the Rocky Mountain Bell and the Independent, each with a large local exchange, affording excellent service and practically free to subscribers throughout the county.

This city is the southern terminus of a proposed interurban electric railroad, extending northward to Logan, a distance of 150 miles, traversing the very heart of the State, directly connecting the city with the State capital, Salt Lake City, sixty miles north, and with most of the leading cities of the State.

Payson was the first city in the State to own and operate its own electric light plant, dating back to the year 1897. In 1905 a large sum of money was expended in improving the system, and today the city boasts of one of the most modern plants in the West, furnishing excellent service and at reasonable rates.

Opportunities for Investors.

A magnificent site for a power plant has been selected and the plant is in course of erection in connection with the great Strawberry project, by which the waters, after leaving the reservoir and before reaching the valley are to be utilized in generating electricity in a plant of 3000 horsepower capacity, furnishing not only lights but sufficient power for electric railroads, flour mills and various manufacturing industries, which the district, with the advent of the water supply, will ably support, and which will prove profitable investments for the promoters.

Among the present opportunities for investment may be mentioned the following: A flouring mill, where might be handled the 60,000 bushels of wheat produced here, in addition to large amounts produced near farms and villages naturally tributary to the city; canning plant, supplied with fruits and vegetables in unlimited quantities and of unsurpassed quality; pickling works; shoe manufactory; laundry; starch manufactory; builders' and contractors' mill work plant, much of the machinery for which is now in the city; music house; bakery, and numerous other business openings.

Mining a Great Resource.

Among the other resources provided so lavishly by nature in this favored locality is that of mining.

Situated in the mountains, about twenty miles west and reached by one hour's ride over one of the most intricate and picturesque pieces of railroad in the world, forming a double loop, is the great Tintic Mining District, one of the richest in the entire West in gold, silver, lead and copper. The dividends from these mines aggregate a great sum. This is not a wild cat district, some of the mines having been producing for the last twenty-five years, while new ones, equally rich and easily accessible, are being developed almost weekly. The stock is being eagerly sought and often at fabulous prices. This district affords a valuable market for the products of the valleys below, Payson being favorably located to enjoy a full proportion.

Many of the families of those engaged in the mines in this district make their homes in Payson to enjoy the many advantages to be found there. Nor is this all, for in the foothills and mountains south of and reaching almost into the limits of Payson itself, mining properties are being opened up which, it is believed, will rival those of the famous Tintic district. Already several companies have incorporated for large amounts. Their stock is being quickly taken up and extensive development work is being done on several of the mines.

Situated in the valley heights of the great Rocky Mountains, surrounded by mountains whose towering peaks are almost perpetually covered with snow, the Utah Valley has an ideal climate—the winter weather purified and cleansed by cold and frost, the summer months sufficiently warm and balmy to mature all cereals, vegetables and fruits of endless variety, with cool mountain breezes to refresh and invigorate.

The official mortuary records of Payson show only twenty-two deaths during the year 1906. Situated in the mountains about twelve miles east of Payson and readily reached by railroad or furnishing a pleasant drive over a good road is the beautiful Castilla Mineral Springs Health Resort. In addition to the mineral springs baths and commodious hotel, there are a park, baseball grounds and a dancing pavilion. These amusements, associated with the almost continuously snow-capped mountain peaks towering above it, and other environments, make it an ideal place to spend a summer vacation.

A few miles farther along the same road and located almost in the tops of the mountains is the famous Strawberry Valley, where thousands of pleasure seekers annually spend their vacation enjoying the pure mountain air and water and angling for trout in the streams flowing through the valley.

Many Beautiful Pleasure Resorts.

Three miles to the south and at the very base of a lofty mountain is situated picturesque Spring Lake Villa, offering opportunities for the establishment of a bathing resort in the clear water of a silver lake, fed continually by springs having their source but a few rods distant. Six miles to the north and washing the shores of the land to be reclaimed by the water of the Strawberry project is Utah Lake, fourteen by twenty-four miles in dimensions, its waters fresh and teeming with trout, bass, cat fish, carp, chub and many other varieties of the finny tribe affording not only sport for the angler but food for his family.

Neither least nor last, but forming an important factor in the upbuilding and development of the resources of the city, is the Payson Commercial Club, organized May 9, 1906, comprising a large membership of the most representative of the citizens of the community, including merchants, bankers, farmers, stock and sheep men, mining men and professional men.

Matters of vital importance to the city have already been accomplished and the Commercial Club

1---Main street, looking south.
2---Residence of C. F. Dixon, Payson, Utah.
3---Church of Jesus Christ of Latterday Saints, Nebo Stake Tabernacle, Payson, Utah.

4---Hotel Wightman, Payson.
5---Peteetneet School.
6---Methodist Church, Payson, Utah.

has under consideration further plans that mean much to the future of the county.

Commodious and cosily equipped club rooms, occupying the second floor of the Persson Building, have recently been fitted up. There the members and visitors meet whenever desired, to discuss matters pertaining to the advancement and welfare of the community as a whole.

The board of governors of the club as now constituted is composed of William D. Dixon, merchant, president; Thomas Reece, merchant, vice president; Justin A. Loveless, real estate and harness, secretary; Cyrus E. Snell, banker, treasurer; James S. McBeth, farmer and sheepman; Jonathan S. Page, Jr., postmaster and merchant; Thomas H. Wilson, Jr., farmer and merchant; Isaac Hanson, farmer and mining man.

With all the natural and, at present, developed resources of this city, together with those soon to be realized through the advent of the great Strawberry project, the chief benefits of which will be realized in her midst, Payson is destined to become within a short time one of the most prosperous, as it is now one of the most progressive, municipalities in the West.

The immense benefit to be gained to the citizens of Payson by this enterprise alone can be better realized when it is understood that while with the present supply of water from the valley streams not more than 4000 acres of land are actually irrigated, with the completion of the project 50,000 to 60,000 acres will be furnished an ample water right, which will insure to the community a rapid, substantial, steady growth.

As a result of the work already accomplished, an impetus is being felt in the direction of increased confidence and the investment in business enterprises and real estate.

Some Figures.

THE recent rise in the cost of meat, which has affected the pocketbook very severely, has awakened considerable interest in the subject of meat slaughtering and meat packing. This is one of the most important industries in the country, and the total value of the products is well up toward the billion mark. The following table prepared by the Bureau of the Census gives the salient facts concerning this gigantic industry:

SLAUGHTERING AND MEAT PACKING—MATERIALS USED, BY KIND, QUALITY, AND COST; AND PRODUCTS, BY KIND, QUALITY, AND VALUE: 1905.

Materials used, total cost	$805,856,969
Beeves:	
Number	7,147,835
Gross weight on hoof, lbs.	7,485,407,944
Net weight, dressed	4,066,264,877
Cost	$289,040,930
Sheep:	
Number	10,875,339
Gross weight on hoof, lbs.	930,168,367
Net weight, dressed	464,872,621
Cost	$44,359,804
Hogs:	
Number	30,977,639
Gross weight on hoof, lbs.	6,586,349,782
Net weight, dressed	5,048,832,850
Cost	$329,765,480
Calves:	
Number	1,568,130
Gross weight on hoof, lbs.	261,683,572
Net weight, dressed	161,049,581
Cost	$12,665,557
Dressed meat, purchased fresh or partially cured (to be manufactured)	$53,114,957
All other materials	$76,848,336
Products, total value	$913,914,624
Beef:	
Sold fresh—	
Pounds	3,748,055,377
Value	$247,096,724
Canned—	
Pounds	98,663,931
Value	$7,697,815
Salted or cured—	
Pounds	136,896,697
Value	$8,107,952
Mutton, sold fresh:	
Pounds	460,754,244
Value	$36,880,455
Veal, sold fresh:	
Pounds	154,212,652
Value	$12,856,369
Pork, sold fresh:	
Pounds	1,224,932,910
Value	$91,749,323
Salted—	
Pounds	1,558,886,256
Value	$116,626,710
Hams, smoked bacon, sides, and shoulders:	
Pounds	1,364,015,706
Value	$132,210,611
Sausage, fresh or cured:	
Pounds	324,416,039
Value	$25,056,331
All other meat, sold fresh:	
Pounds	124,307,081
Value	$9,579,718
Lard:	
Refined—	
Pounds	1,048,362,039
Value	$74,116,991
Neutral—	
Pounds	120,724,361
Value	$8,423,973
Oleomargarine oil:	
Gallons	19,454,799
Value	$10,201,911
Other oils:	
Gallons	4,893,133
Value	$2,595,951
Fertilizers:	
Tons	211,137
Value	$4,397,626
Hides:	
Number	8,039,204
Pounds	456,443,857
Value	$44,206,107
Wool:	
Pounds	16,377,333
Value	$5,229,521
All other products, including amount received for custom and contract work	$76,880,536

The figures are for the year 1905 (the last totals available) and we have attempted to show graphically, as we have already done with bread, etc., what this industry really means, says the Scientific American.

The composite beef, which is literally on the hoof, is only 1,236 feet long to the shoulder, and is only 927 feet high to the shoulder. This animal only weighs some 7,485,407,944 pounds as he stands on his hoofs, but cuts up with some loss of weight, the product being:

	Pounds.
Fresh beef	3,748,055,377
Canned	98,663,931
Salted or cured	136,896,697
Total	3,983,616,005

Showing an apparent loss of 3,501,791,939 pounds, but all that comes to the meat packer is in the nature of grist, and it is doubtful if the actual loss is very great. The hides, the horns, the hoofs, the bones, the blood, etc., all have to be reckoned with.

The fresh beef is represented by hind and fore quarters of beef, one 480 feet high, the other 504 feet, and 280 and 290 wide respectively. The beef that is salted would fill a barrel 220 feet high and 147 feet in diameter at its widest point. Canned beef makes a nice little seven and a half million dollar can, 145 feet high and 128 feet wide. That much-abused animal, the pig, also makes a good subject, for the total number of hogs slaughtered in 1905 was 30,977,639, weighing 6,586,349,782 pounds on the hoof, and 5,048,832,850 pounds, dressed, thus showing a comparatively smaller shrinkage. The cost was $329,765,480, and value of the product was much more. The height of the composite hog would be 785 feet, and the length "over all" would be 1570 feet. The pork that is salted would fill a barrel 332 feet in diameter at its largest part, and 495 feet high. The lard would fill a tin pail 334 feet high and 295 feet in diameter. The smoked ham would be 490 feet high and 374 feet across at its widest part. The sausages placed end to end would make a continuous chain 151,714 miles long, or 6.1 times the circumference of the earth.

The sheep is the smallest of the trio, being only 666 feet long and 555 feet high to the shoulder. This animal is made up of 10,875,339 sheep, and weighs 930,168,367 pounds on the hoof, but the net weight is 464,872,621 pounds, showing quite a shrinkage. The amount of fresh mutton sold amounted to 460,754,244 pounds, valued at $36,880,458.

The total value of the material used was $805,856,969, and the total value of the products was $913,914,624, showing a difference of $108,057,659, certainly a tidy little sum for labor and profit. Such is in brief the slaughtering and meat packing industry.

A New Tea Drier.

Consul-General W. H. Michael, of Calcutta, states that a new tea drier, recently invented by a citizen of India, has been introduced and tested on the Huldibari tea estate, in the Dooras (eastern India), which is reported to have proved very successful. Mr. Michael adds:

In a set of trials it turned out 500 pounds of 90 per cent fired tea in one hour, and 700 pounds of moisture were evaporated during the same time The principle of the machine is that the hot air is forced into the drying chamber of the machine under pressure by a fan, which is a new idea and better than the old type of automatic driers, in which the hot air was exhausted from the drying chamber. It is claimed by the inventor (whose address is registered at the Bureau of Manufactures) that tea dried by use of the machine is superior to that made in the old way; that none of the flavor is taken away from the tea, nor is the essential oil destroyed in the process of manufacture.

WASHINGTON PROJECTS

Yakima Valley One of the Fairest Reclamation Spots

THREE PROJECTS UNDER WAY IN STATE AND OTHERS WILL BRING TOTAL OF RICH LAND TO BE COVERED WITH DITCHES TO NEARLY HALF A MILLION ACRES

THERE are three projects under way in the State of Washington, the Okanogan, Tieton and Sunnyside. The two last named are in the Yakima Valley, where ultimately about 400,000 acres will be given water under several projects or units. It was deemed advisable to push the Sunnyside, Okanogan and Tieton to completion pending the adjustment of existing water rights in the others. The Yakima project collectively is the largest yet decided upon by the government.

The Okanogan project will carry the waters of the Salmon River upon 10,000 acres of land, 1350 acres of which have old water rights, leaving 8650 that will have to pay for the project. The Salmon River drains about 152 square miles in the eastern foothills of the Cascade mountains.

The cost of reclamation will be about $50 an acre and it is expected that the project will be opened next year. In December, 1905, the Secretary of the Interior set aside $500,000 for the work. The land to be watered is virtually worthless without irrigation. The farm unit will be forty acres.

The Okanogan Project is situated in Okanogan County, Washington, the irrigable lands lying to the west of the Okanogan River, with the towns of Alma and Riverside on their borders. The project can not at the present time be reached by rail and is most easily accessible from the town of Wenatchee on the Columbia River, which is a station on the Great Northern railroad. Steamers run up the Columbia River as far as Brewster, from which point travel is continued by stage to Alma, situated at the confluence of the Salmon River and the Okanogan River.

Waters of Salmon Stored.

A total storage of 13,000 acre-feet is necessary to utilize the entire flow of the Salmon during years of low run off. Salmon Lake and Conconully reservoir supply this.

Salmon Lake reservoir, a natural lake about three and one-half miles long, immediately east of the town of Conconully, is on a small branch of the north fork of Salmon River. It has an available capacity of 2000 acre-feet the low water elevation being 2285 and the high water 2295 above sea level. The inlet canal is of 13 second feet capacity and lined with paving. The outlet is through a simple concrete structure. No dam is used for this reservoir.

Conconully reservoir, immediately south of the town of Conconully, will be created by building an earthen dam across Salmon River below the junction of the north and west forks. The capacity of the reservoir will be 13,000 acre-feet. The dam will have a maximum height of 60 feet and a length of 1000 feet. The outlet will be through a concrete lined tunnel and controlled by two 36-inch cast iron gates. Construction work is in progress by force account.

After passing the Conconully reservoir, the water will follow the natural bed of Salmon River for about twelve miles to the point of diversion. The diversion is accomplished by a concrete weir fifty feet long and four feet high. The main canal has a capacity of 100 second feet. Irrigation commences about one mile below the diversion weir. There will be about twenty miles of main canals and main laterals and about thirty miles of small laterals. The canals and distribution system are now being constructed partly by small contracts and partly by force account.

The irrigable lands have an elevation of 850 to 1350 feet above sea level, and lie in a series of benches sloping toward Okanogan River. The soil is mainly sand, light loam, and volcanic ash. Irrigated lands in alfalfa yield a profit on a valuation of $100 per acre, and lands in fruits or nuts, for which the soil is especially adapted, yield profits on a much higher valuation. The average annual rainfall here is only eight inches. The maximum temperature is 105 degrees and minimum 10 degrees.

The Okanogan Water Users' Association was organized in October, 1905, and through this organization all acquired private lands have been committed to the project. All requests for information about lands under the project should be addressed to this Association.

The Sunnyside project is the largest of the three under way in Washington. It embraces 86,600 acres, but of this 40,000 is already under water from the Sunnyside canal, owned by a private corporation at the time the government took up the project. For this canal, with a carrying capacity of 650 second feet and water appropriations sufficient to cover all the company's lands, the government obtained an option, the price being $250,000. The option was extended from time to time during investigations. The project was approved in December, 1905, and $750,000 set aside under condition that the water rights situation could be satisfactorily adjusted. This adjustment was made and the existing canal purchased, and thereupon $350,000 additional was set aside for the project.

The Sunnyside Water Users' Association was formed in 1906 and worked from that time on to bring in a sufficient acreage of land to warrant

Sunnyside dam. Gates and gate-house from above.

proceeding with the work. The conditions were unusual, as a considerable acreage in small individual holdings was in the ownership of persons living outside the state. Another unusual condition was that with complete development about one-half the water users' lands would own water rights secured from the Washington Irrigation Company, which would need to be operated in terms somewhat different from those of the new lands under the wording of their contracts. Inducing the old water rights lands to join the association so that there might be a uniform and harmonious system was another necessity.

Works on Project Simple.

There are no striking engineering features connected with the Sunnyside project. The work of the government consists in the main of rebuilding the diversion dam and gates on the Yakima River, the new design contemplating replacing them with a low concrete weir. The original dam was a movable one.

Water will be supplied to about 4000 acres more next season.

Drainage has been found to be a necessity in the vicinity of Sunnyside. The people there organized drainage districts under state laws for mutual protection and expended more than $30,000 on this work. Then farmers have asked the government to take it over and combine a drainage with the irrigation system.

Part of the water will ultimately be carried across the river to lands there. The Reclamation Service is replacing wooden with masonry structures, enlarging the present canal and extending it, this work including two siphons across the Yakima River, and extending the lateral system. The siphons will be rather expensive features. The length of the main canal will be sixty-three miles and of the laterals 205 miles. About 1300 electrical horse-power will be developed for pumping.

The project is located in the counties of Yakima and Benton. The elevation is from 630 to 850 feet. The maximum temperature is 110 and the minimum zero. The average rainfall is seven inches. Forage, fruits and hops are the principal products and the markets Seattle, Tacoma and Spokane. "Deep, light, volcanic loam" is the description given of the soil. Irrigated land is worth from $100 to $600 per acre.

The farm units will be from forty to eighty acres and the cost of water rights about $50 an acre. About 77,000 acres lie on the east side and about 9000 on the west side of the river.

Lake Clealum dam from the left bank of the river. Pumping engine at left. Top of crib dam in foreground.

There were only about 2500 acres of public land.

Long Concrete Aqueduct.

In the construction of the Tieton project, which will carry water to 24,000 acres of land at a cost of something over $60 an acre, there will be built a twelve-mile aqueduct in the Tieton Canyon to take the water from the river of that name. Two and one-quarter miles of this aqueduct will be a concrete-lined tunnel and the remainder all practically concrete lined canal. This work is being done now partly by contract and partly by force account by the government. From the end of this aqueduct, the water will be taken to the lands by a distribution system.

The work on this project is about 20 per cent completed. It is hoped that water will be turned into the government works in time for the irrigating season of 1909. Several hundred men are at work. Insufficient labor and a shortage of supplies have occasioned a considerable delay.

A preliminary allotment of $1,000,000 was made by the Secretary of the Interior in December, 1905. Upon the satisfactory adjustment of water rights, a Water Users' Association was formed. On the following June an additional allotment of $250,000 was made, because of the expensive canyon work. This canyon-division work was some of the hardest undertaken by the service, being on a steep sidehill and one-fifth of it tunneling.

Looking across Keechelus crib dam from right bank showing drift. Engineer Jacobs and Watchman Hausen in foreground.

Lands Have High Value.

The soil under this project is largely a sandy loam of basaltic origin and varies in depth from a few inches to many feet. The rainfall is insufficient to produce full crops. The lands are rolling and are adapted to the growing of fruit, hops, vines, grain, alfalfa and tuber crops. The farm unit will be forty acres. Value of irrigated lands is given at from $100 to $1000. The elevation is 1200 to 2100 feet, and the temperature ranges from zero to 108.

Of the 24,000 acres of land about 2500 are government, the same amount state and half as much railroad land. The state and railroad lands are not on the market.

The Great Northern Railroad traverses the Yakima Valley, giving transportation to all the projects. Other railroads are preparing to reach them.

The address of the Tieton Water Users' Association is North Yakima, Washington.

Indians Own Rich Lands.

Some of the land capable of being most easily and cheaply irrigated in the Yakima Valley, Engineer Henny says, lies within the Yakima Indian

Reservation in the central part of the valley, containing the towns of Wapato, Toppenish and Alfalfa, all stations on the Northern Pacific Railway. Some irrigation has been carried on by the Indian Department for the benefit of the Indians, but it is believed that no real progress can be made until the Indians sell the largest portion of their allotted lands and thus permit the whites to obtain a foothold as land owners. To this end suitable legislation has been passed by Congress. The consent of the Indians themselves, however, is required before construction of this project can be undertaken, and efforts are now being made to obtain such consent. The Wapato unit is of the greatest importance to the Yakima Valley as a whole owing to its central location and the large area of lands which it can irrigate, which in itself would double the total amount of irrigation which has so far been carried on in the valley.

Tieton Canyon, Camp No. 1. Interior of automatic spillway.

In connection with the known units of the Yakima Project and with additional units which may receive the approval of the Secretary of the Interior, large storage works are contemplated on the lakes at the head waters of the Yakima River and on Bumping Lake at the head waters of Bumping River, a branch of the Naches, which is the main branch of the Yakima River. All these lakes, especially those at the head waters of the Yakima River, offer excellent and economical opportunities for the storage of a large amount of water. Low dams are now being constructed by the Reclamation Service at the outlets of Lakes Keechelus and Clealum, and title to an existing small dam at the outlet of Kachess Lake has been acquired by the government. These low dams are likely to furnish a sufficient storage to permit the development of approved units for a few years, after which permanent high dams will be constructed successively as fast as needed at each of the above lakes.

At Bumping Lake an earth dam will be constructed which will raise the water in the lake about thirty-three feet and will store 30,000 acre feet. The total storage when all dams are completed will aggregate about 800,000 acre feet.

Alfalfa in Ecuador.

Consul-General H. R. Dietrich reports from Guayaquil on alfalfa culture in Ecuador as follows:

As to its origin (medicago sativa) was introduced into Ecuador by the Spaniards in the sixteenth century. There is also a species of alfalfa with yellow blossoms that is indigenous to the country and different from the European variety, but with none of its advantages, and is not cultivated. The extremes for the cultivation of alfalfa in Ecuador are between 1600 and 3200 meters (meter equals 39.37 inches) above sea level. Outside of these limits the production is forced either by an excess or want of heat. The lands lying between the two Cordilleras, at an elevation of from 2600 to 2700 meters, of deep sandy soil and volcanic origin, are best suited for its cultivation. The average temperature at this elevation is 15 degrees C.

There are two varieties of alfalfa—one with green or carmine shoots and the other with violet shoots. The latter is more tender and juicy, with the foliacious system more developed; unfortunately, it requires very fertile soil and produces but little seed. Sometimes the seed is sown broadcast in the field, but the most usual manner is to transplant the shoots in lines or furrows to facilitate irrigation. After each crop is cut the soil at the roots of the plant is loosened and the field is irrigated. The annual cost of cultivating alfalfa is from $8 to $18 United States currency per hectare. In rich soil the yield is enormous, sometimes reaching 120,000 pounds per hectare (hectare equals 2.471 acres) per year. The normal yield is 80,000 pounds. In the table-lands the alfalfa gives from five to seven crops yearly. In the very high altitudes, of 2800 meters or more, it scarcely gives three crops per year. As there is no winter in Ecuador, the alfalfa is always fresh and vigorous, and for that reason it is not made into hay. It has no enemies, and the duration of an alfalfa field in good land is from twelve to fifteen years.

India's High Food Cost.

A report from Consul-General W. H. Michael, at Calcutta, states that the director-general of commercial intelligence for British India has published an estimate to the effect that the dearness of food grains during the last year compelled the people of India during the year to spend an additional sum of money for their subsistence amounting to $322,100,000. Mr. Michael comments:

This tremendous increase of expenditure for subsistence by the people is pointed out as a probable reason why there was a decrease of $5,000,000 in the purchase of Lancashire cotton goods. But this does not cut much of a figure when it is considered that the total value of the merchandise imported into India during the year was a trifle over $360,000,000. According to these figures it would seem that the people of India expended for food alone a sum equal to eight-ninths of the whole expenditure for imported merchandise. The boycott, it is acknowledged, cut down the importation of salt to the amount of 1640 tons, and thus if the figures of the director-general of intelligence are correct, and we must accept them as such, the boycott must have operated effectively in connection with other causes against other articles of merchandise than Lancashire cotton.

Cape Colony Ostriches.

Consul-General Julius G. Lay, of Cape Town, reports that since a prohibitive export duty of $486.65 has recently been imposed on each ostrich sent out of Cape Colony a bill has been reported favorably in the legislature entirely prohibiting the export of ostriches or ostrich eggs. To this he adds:

Fifty years ago ostrich feathers were obtained by hunting traders who shot wild ostriches in the interior of the country, but in the sixties chicks from the wild parent birds were caught and domesticated with a view to farming them for their feathers. Since those days ostrich farming has become one of the most important industries of this colony, the amount of feathers shipped in 1905 from the colony amounting to approximately 471,024 pounds valued at $5,261,596. There was a further increase in feather exports last year, the value being $6,842,878. Some years ago small shipments of ostriches were made to the United States, Australia, and New Zealand, but the new measures will no longer permit this.

Ostriches are now bred by selection, and matings are not made haphazard as formerly. There is a great difference between the value of ostriches for this reason, and a common-bred bird can be bought in thousands in Cape Colony for $15 to $20 each, while for high-class ostriches of special merit as much as $500 to $2400 each is paid; but while the former yields in feathers only $5 to $7.50 each at a single plucking the latter will produce feathers valued at from $40 to $60, and some birds have been known to return as much as $100 at a single plucking.

Wyoming Project

Here is Rising the Highest Dam in all the World

SHOSHONE PROJECT EMBRACES UNUSUAL FEATURES, INCLUDING HEADWORKS IN ROCK CLEFT AND NOTED CORBETT TUNNEL THAT WILL BE SIGHTS FOR TOURISTS

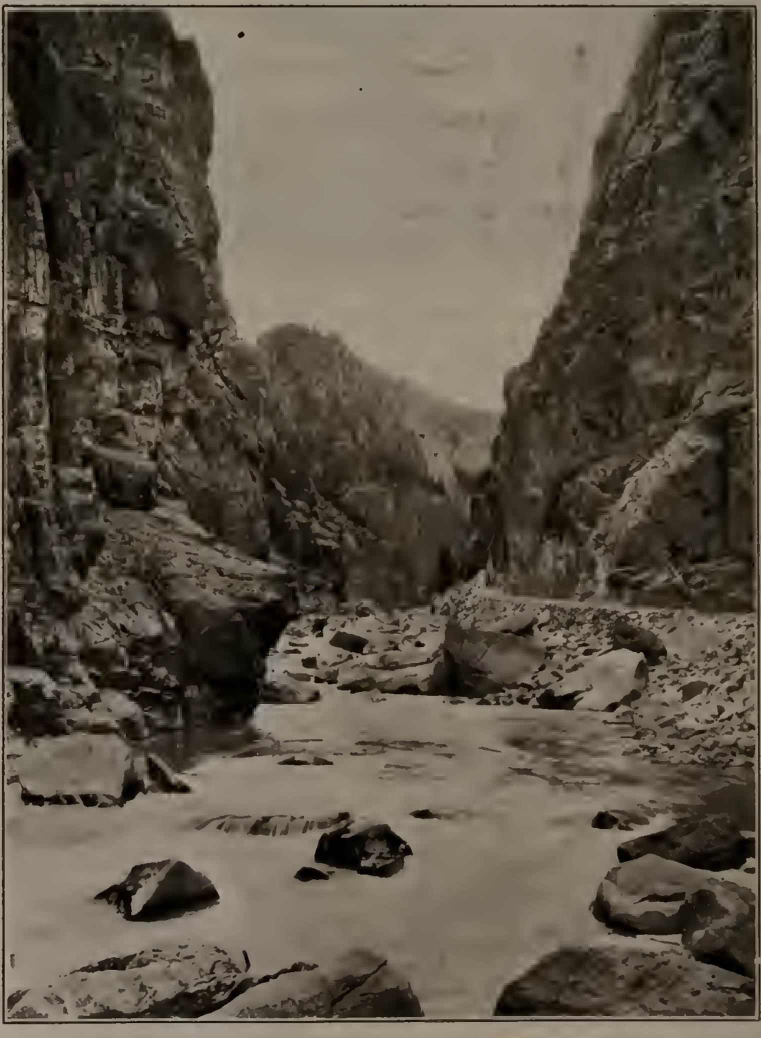
WHERE the belligerent Shoshone River boils and sputters through a narrow gorge of solid granite, 250 feet deep, in the wilds of Wyoming, there is rising by the slow but sure process under which such tremendous structures are built, the highest dam of the Reclamation Service and of all the world. It is to form the reservoir for the Shoshone Project, from which 125,000 acres of land are to be irrigated. There has been constructed also in connection with this project the celebrated Corbett tunnel, three and one-half miles long, next in importance to that remarkable one in the Gunnison. It was completed on the afternoon of June 21.

The Shoshone Project is distinguished also through its embracing the largest amount of public land of all those begun by the government. All but 2 per cent of the area to be redeemed is open to entry by homesteaders. The cost will be about $32 an acre and about 90,000 acres will be embraced in the first units.

The reservoir that will be created by this dam will cover 6600 acres and its capacity will be 456,000 acre feet. The dam will be only 200 feet long at the top and 85 feet at the bottom of the river channel. These dimensions illustrate the narrowness of this sword cut in the mountain of solid rock that the government is proceeding to set a masonry wedge in. The height of the dam is to be 310 feet in its entirety, though only 240 feet of this will rise above the river channel. There will be a foundation, like the root of a tooth, beneath the river level. The gorge where the dam is rising lies between picturesquely named Cedar Creek and Rattlesnake Mountains, near the station of Garland on the C., B. and Q. Railroad.

The main low line artificial waterway under this system will be known as the Garland Canal. Through a tunnel bored around one side of the dam, ten feet above the reservoir floor the water will be drawn from the big receptacle and turned into the river again, as needed, during the irrigating season and will be conveyed from the river through the Corbett tunnel to the Garland canal heading. A spillway cut at the top of the big dam will permit the surplus flood water to pass off during the rainy season.

To divert the water, after it has left the reservoir, into the tunnel, a diversion weir to be known as the Corbett dam will be constructed across the Shoshone River. This dam will be 400 feet long and 18 feet high and will be constructed of concrete, with steel reinforcement.



Looking west up the Shoshone Canyon from a point one-quarter of a mile west of headquarters camp, showing the newly completed canyon road into the Shoshone Box Canyon, Wyo. Dam will be built in this gorge.

Road built through Shoshone Canyon for hauling material to Dam site. Shoshone project.

Work Is Divided Into Units.

The heading of the Corbett tunnel in Shoshone River is opposite Corbett station, on the Cody branch of the C. B. and Q. Railroad. The tunnel's lower portal is in a ravine about 17,000 feet below the upper. The line of the tunnel is parallel to the general direction of the bluffs, which has permitted of openings being made from this side for the creation of intermediate portals. Thus the work of construction was cut up into several smaller sections, which permitted of the completion of this unit of the works at an earlier date, though much time was lost at the start. The material through which the tunnel was constructed made much concrete lining and heavy timbering necessary.

The contract for driving this tunnel was let to a Montana firm for $594,325 and work began in November, 1905. The work of excavating the portal openings or adits from the side of the bluffs was very slow, the main tunnel line not being reached in the first one until January of the following year, in which month the excavation for the tunnel proper began at the lower portal. Later, however, the work was prosecuted with more dispatch.

At a point in the ravine about 1000 feet below the lower portal of the tunnel, a settling basin will be constructed by throwing up an earth embankment forty feet high and 150 feet long. Nearly all silt passing through the main tunnel will be deposited in this, so that the water will be comparatively clear when it flows into the main canal. A spillway will discharge all surplus waters entering the basin from the drainage tributary to it and it will also serve as a regulator for the water entering the canal. A 4x5 sluicing tunnel will be bored through the ridge to carry off the silt deposits in the settling basin.

Temporary dam, contractor's camp and roads, Shoshone dam, near Cody

Flood Destroys Diverting Flume.

There will be sixty miles of main canal and 150 miles of laterals under the Shoshone Project. The Garland canal heads at the settling basin and extends nearly to Frannie Station, on the Cody branch of the C. B. and Q., a distance of forty-two miles. It will have a capacity of 1000 second feet for the first nine miles, diminishing as the distributing canals leave it. On what is known as Garland Flat about 50,000 acres will be covered and about 30,000 acres in the vicinity of Frannie. Other canals and laterals will convey the water to the rest of the irrigable area.

The contract for constructing the Shoshone dam was let to a Chicago firm in September, 1905, on its bid of $515,730 and it began work on the temporary diverting works in October. The temporary dam built to divert the water of the river into a flume pending the construction of the outlet tunnel, and give a clearer way for the erection of the permanent dam is 430 feet long and seventeen feet high. The flume built in connection with the diversion dam was planned for a flow of 2000 second feet. When the river reached its highest stage in June, 1906, the outlet tunnel had not been completed. The water rushed over the temporary dam without damage, but it destroyed the flume. The failure to get the outlet tunnel completed before high water and to fetch material to the ground in time for the immediate construction of the flume, caused a serious delay in the work of constructing the dam, the engineers report.

The wagon road to the Yellowstone National Park from Cody will be partly destroyed by the creation of the Shoshone reservoir, which will submerge a portion of it. The road that the government has constructed through the Shoshone Canyon to the dam site will supplant this section. Part of the project road is cut out of the solid rock and there are two tunnels bored through rock.

The Shoshone Project is located in Bighorn County. The elevation of the lands is from 4000 to 5000 feet. Hay and grain are the principal crops at present, though there will be a diversity when the land is irrigated. The principal markets are local, the mining regions being large consumers. The land is a light sandy and clay loam. There is a rainfall of from six to ten inches, and the temperature ranges from 95 degrees, maximum, to 30 degrees, minimum.

Looking north on curve from station 30-75 south heading, Corbett tunnel

Let Us Be Thankful.

Why should we circumscribe thankful confessions
To the scant space of a week, month or year?
No inventory of worldly possessions
Lists half the blessings that maketh life dear!
Health, strength and happiness, joy in life's living,
Husbands and friends, forsooth, children and wives—
Too great's the number for one day's Thanksgiving,
Let us be thankful each day of our lives.
November, 1903. —Roy Farrell Greene.

Buttermilk as a Tonic.

Ordinary sour buttermilk is a better tonic, is a better food than was ever bottled or boxed up by the chemist or doctor. Buttermilk is a very hearty food. Two glasses a day is enough for any one. This should be drunk with meals, or else should not be taken within two hours of a meal, says McCall's Magazine. Time should be given it to thoroughly digest before anything else is taken into the stomach. It takes buttermilk considerably over an hour to digest, and to drink another glass before the first one is digested is only to stir up difficulty with the digestive organs. Really, the best way to drink buttermilk is with the meals, though it may be drunk between meals as a sort of easily digested lunch.

Thanksgiving.

O, gracious Father, for Thy care,
Thy tender mercies all the way,
For friendships true and love sincere,
We offer Thee our thanks today.
For gifts of sunshine and of rain,
For all that made the moments dear,
Our gratitude—in joyful strain
We sing Thanksgiving's song of cheer.
November 15, 1898. —Lalia Mitchell.

PROJECTS THAT THE FUTURE WILL KNOW

IN Arizona there are three proposed projects that will reclaim large areas of desert land if carried out. Only preliminary investigation has been made concerning them. One contemplates taking water from the San Pedro river, another, known as the San Carlos Project, would utilize the flows of the San Francisco and Gila rivers, and the third contemplates the use of the water of the Little Colorado.

California.

Investigations have been carried on in the San Joaquin Valley also to determine the underground flow with a view toward establishing pumping plants. It is said that the government engineers believe that the Federal government can water 200,000 acres of land in the lower part of the valley if the landowners will co-operate. Vested interests may prevent government systems covering more than this, though the area subject to irrigation is large. It is said that a good chance for a government system exists toward the head of the river and that at several places large tracts could be irrigated by pumping, providing fuel were not too expensive.

Colorado.

A Water Users' Association has been formed as an initial step toward carrying out the suggested Grand Valley Project, in Colorado, but there are no funds available for it at present.

Under this project there is a site for one of the largest reservoirs yet planned by the Reclamation Service. It is on the Grand river, which would supply the water, and is known as the Kremmling site, because of proximity to the town of Kremmling, in the lower part of the river basin. Here, by the construction of a dam 180 feet high, in what is known as Gore Canyon, 1,000,000 acre feet of water could be stored. With a 230-foot dam, that capacity would reach the tremendous extent of 2,200,000 acre feet.

Should this project be carried out, and it appears to be a feasible one, the Kremmling reservoir would be 150 miles long from the dam site to where the Grand river would flow into it and three miles across at its widest place in the lower part. It would have two arms up Muddy creek and Blue river, nine and one-half and eight miles long, respectively.

The town of Kremmling, which has 200 people, would be submerged by the reservoir, the water in which would cover it to a depth of 100 feet. About 10,000 acres of valuable hay land would be sacrificed also. There is in addition a small settlement known as Troublesome that would cease to cause worry any more, as it would sleep among the fishes on the floor of the great artificial lake. The government would have to pay for these towns and the hay lands if it constructed the reservoir, but the whole would not form a large item in the tremendous work.

The Grand river tears its way as an angry torrent through chasm and gorge in its upper watershed, but becomes a sluggish, tame stream when it emerges into the basin that would form the Kremmling reservoir. Upon entering the park range of mountains, it finds the Gore Canyon and there becomes again the wild thing it was in the fastnesses further up. For three and a half miles through this canyon it has a fall of 100 feet to the mile.

Many thousand acres could be irrigated under this proposed system.

The service has been investigating several proposed reservoir sites at points along the Colorado river, the waters of which it is thought can be utilized to irrigate large areas.

Idaho.

That mother of great irrigation projects, Idaho, is destined to have another system, constructed by the Federal government, that, while known as a secondary project, will really be more extensive than the famous Payette-Boise system, and in fact the largest in that state. This has been named the Duboise Project. Its carrying out only awaits the availability of funds. It has been pronounced feasible and advantageous by the engineers.

The Duboise Project will bring something like 250,000 acres of land, nearly all public domain, under water. The tract lies in the western part of Fremont county, on the north edge of the Snake river valley. There is a total of nearly 400,000 acres of fine desert land, easily irrigable. The land is mainly between Mud Lake and the lower end of Big Lost river. The main canal, under the plans prepared, will have its head on the North Fork of Snake river, near St. Anthony, and will cross the main Oregon Short Line railway near Duboise.

The genius of the engineers will be taxed to the utmost in finding out storage for this system. Every acre foot of water means that much more of fertile land reclaimed. Almost every storage basin on the North Fork and its tributaries will have to be utilized. Twenty reservoir sites have been surveyed. Almost all of them are good but some are not located just where they can be utilized to advantage. Their total capacity would be 1,840,000 acre feet. There are now 95,500 acres of land irrigated in this vicinity and an adjustment of vested water rights will have to be made.

Montana.

In Montana the Reclamation Service is investigating the practicability of irrigating about 200,000 acres under what is known as the Lake Basin Project, lying principally in Yellowstone and Sweetgrass counties. To irrigate all the lands in the lake, Antelope and Hoskins Basins and all those available on the Mussleshell and Yellowstone drainage would require a canal 200 miles long, constructed at a high elevation through a rough country. The water would be obtained from the Yellowstone. The cost per acre, it is thought, would reach $100.

Investigations of the proposed Clarke Fork Projects have been made at the request of the Clarke Fork Canyon Water Users' Association, and the engineers have reported that the amount of lands that could be watered would hardly justify the expense of installing a system, which would be great.

The Madison River Project is another very large one in contemplation. Under this, too, the cost of reclamation would be very high—in the neighborhood of $100 an acre. This project contemplates the irrigation of a total of 148,000 acres—43,000 in and adjacent to Prickly Pear Valley, near Helena; 53,000 in the Crow Creek Valley, on the west side of the Missouri river, near Radersburg, and smaller areas aggregating about 52,000 acres.

To water this land, the only feasible plan is the building of a dam in the Madison river canyon. A structure 150 feet high and 400 feet long on top will impound about 600,000 acre feet of water. This would be discharged into Madison river as required and diverted by a weir dam into a main canal near the mouth of Cottonwood creek, about seven miles below the dam. The canal would follow the left bank of the river for about thirty miles and cross Jefferson river by means of a siphon over three miles long in the vicinity of Willow creek or Sappington and then would run parallel to the west bank of the Missouri, but some distance from it, to McClellan creek, into which it would empty.

There are power plants along the Madison with prior rights to the use of water and these must be reckoned with in establishing an irrigation system. It will be possible to take care of these and still have 2.5 feet per acre of land.

Surveys were made for the reclamation of those lands in the Crow Indian reservation not withdrawn for the Huntley Project and some tracts adjoining, but it is probable that this system will be installed by private capital. There are three divisions of this project—the Fort Custer, with about 28,000 acres, of which about 8000 acres are contained in the old Fort Custer Military reservation; the Waco-Sanders division, under which there are perhaps 4500 acres that can be watered easily, and the Bighorn division, in which about 44,000 acres may be irrigated, but their reclamation is deemed doubtful, owing to the cost.

Nevada.

Besides the Truckee-Carson there is another fine irrigation project accredited to the State of Nevada, though a small portion of it lies in California, that the Federal government is ready to carry to completion as soon as the farmers owning land under existing canals settle certain disputes that are now taking their attention, form a Water Users' Association and petition the government to take hold. This would result in the irrigation of a total of 150,000 acres of excellent land where less than one-fourth that amount is now under ditch. The owners of this have trouble in getting all the water they want at the proper season.

This is the Walker River Project. The government engineers have taken measurements of the water supply, viewed reservoir sites and surveyed all the irrigable lands. The area included embraces all the basin of Walker river in Eastern California and Western Nevada, where lies a large tract of arable land within easy reach of an easily controlled water supply. The Walker river, which is formed by the junction of the East and West Walker rivers joining near the south end of Mason Valley in Lyon county, Nevada, is depended upon to furnish the water. The two forks of this stream rise on the eastern slope of the Sierra in California. The main river meets the fate of most other streams in Nevada. It ends in Walker lake, where its discharge is lost by evaporation.

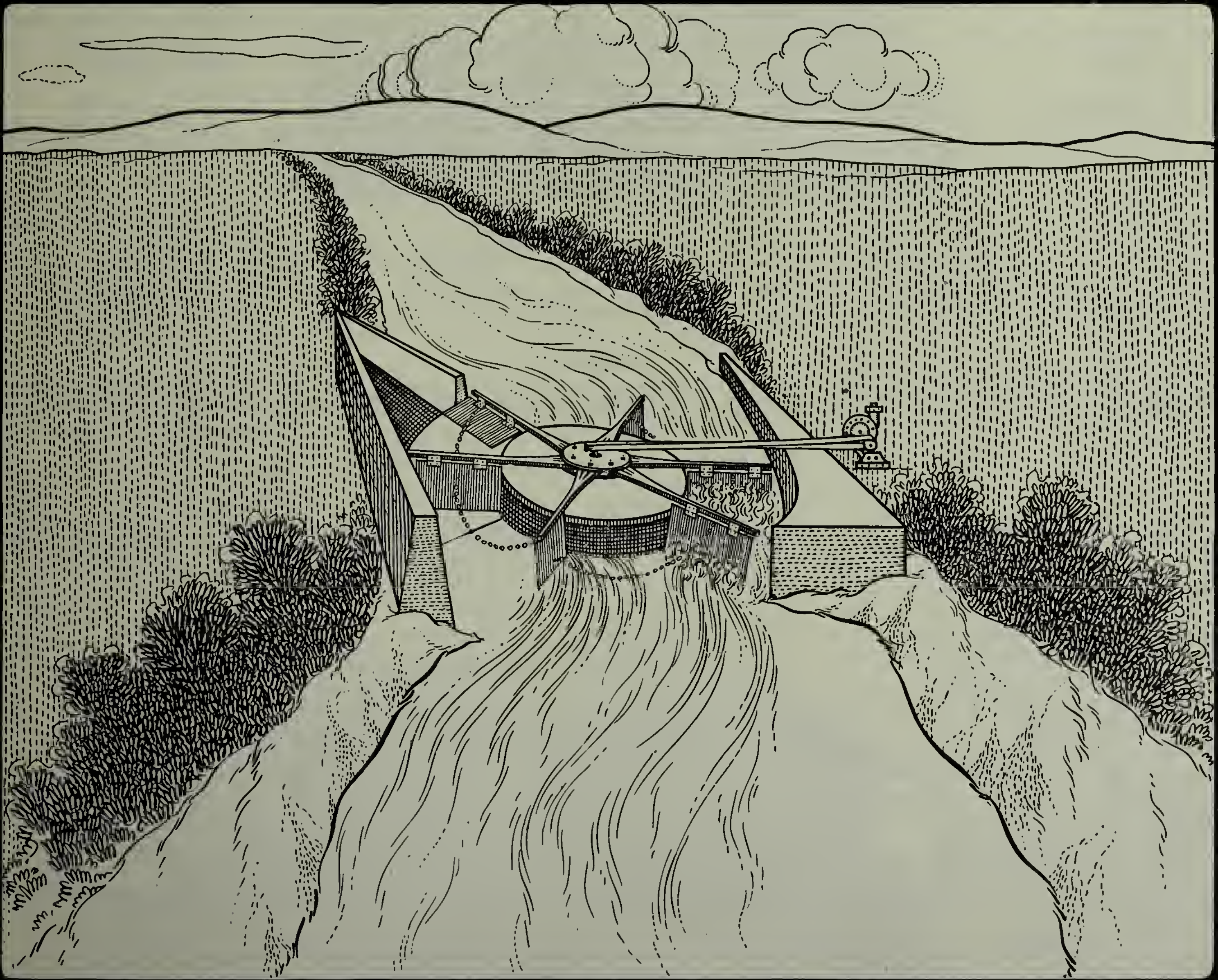
The fertile acres that would come under this system lie mainly in the Antelope and Smith Valleys, the former partly in California and the latter entirely in Nevada, and both on the West Walker river; Bridgeport Valley or Big Meadows on the East Walker, in California, and Mason Valley on the main Walker river in California.

The 40,000 acres under irrigation from private ditches at present are devoted mostly to the production of forage crops.

There have been surveyed as possible reservoir sites Leavitt Meadows, near the head of the West Walker river; and Twin Lakes and Big Meadows on the East Walker. Preliminary sur-

SPEEGLE

HORIZONTAL CURRENT WHEEL



APPLIED IN AN IRRIGATION DITCH

FOR FARM OR OTHER POWER

For description see page 208.

veys for canals have also been made in all the valleys excepting the Bridgeport.

In the winter of 1904-5 farmers in the Walker river valleys who had gone into court for redress because they could not obtain the amount of water due them, appealed to the government to devise a plan by which all the irrigated area could be given an ample and permanent supply. Investigations were made in response to this appeal and a reservoir site surveyed, but the farmers failed to form a Water Users' Association and the matter was left in abeyance for the time.

New Mexico.

By the carrying to completion of the proposed Las Vegas Project in New Mexico, 10,000 acres would be irrigated. The plan is to take water from the Sapello and Gallinas rivers, Sanquijuela creek and Arroyo Pecos and store them in a reservoir in the valley of the Little Sanquijuela. The project is located at Las Vegas. At present stream measuring is about all the work that has been done upon it.

In the northwest corner of New Mexico is a proposed project under which 40,600 acres of land may be irrigated. It is known as the La Plata Project. It presents many discouraging difficulties, but the engineers of the service are trying to find ways by which this tract may yet be watered. The greater part of the land lies along the La Plata river, a tributary of the San Juan. It is proposed to irrigate it by a diversion from the Animas river or by storage reservoirs conserving the entire run-off. Under the former plan, a tunnel three miles long would have to be driven and the main canal would have to be built at great expense through a very rough country. This is looked upon as impracticable. The plan of running the flow into one of the natural waterways directly upon leaving the tunnel has been considered. Several reservoir sites have been found, but none of them has a very promising location.

North Dakota.

Pumping from the Missouri river will be the feature of what is known as the Bismarck Project, near the city of that name in North Dakota, when it is in operation. About 9000 acres of fine bench and some bottom land will be reclaimed. It is expected to irrigate a much larger area under this system, but an extension is not deemed advisable, at present, at least.

There is a prospect of irrigating all or a large part of 100,000 acres of government land under what is known as the Mouse River Project. This would be done by a dam 3000 feet long and forty-five feet high across the Mouse river.

A project with the Little Missouri as the source of water supply is also being investigated by the engineers.

Oregon.

Except for the high cost of the works as compared with the estimated value of the land it is proposed to irrigate, the suggested Malheur Project in Oregon would be a most important one. Under what is called the Owyhee Division of this project, it would be practicable to water 63,000 acres of land in Oregon and Idaho. At Duncans Ferry was found an excellent reservoir site, where a dam 100 feet high would store 190,000 acre feet of water and one 150 feet high 480,000 acre feet. Of this land 27,000 acres lie north of the Owyhee and extend as far as Arcadia and 36,000 acres are south of the river and across Sucker creek, in Idaho.

Under the Malheur Project proper it was found that the cost of irrigation would be about $42 an acre, which the farmers thought too high as compared with their estimate of the value of the land. Unwillingness of the owners to pledge their holdings under conditions satisfactory to the government, and complications over water rights were also found to be serious obstacles.

All work on this project has been indefinitely deferred and the government lands restored to entry.

One tract of 25,000 acres of patented land under this proposed project is owned by a foreign syndicate known as the Roads Land Company. The latter has refused to enter this into the reclamation scheme.

Under the East Umatilla Project about 20,000 acres could be irrigated by the creation of an inexpensive reservoir.

In Central Oregon the proposed Silver Creek, Chewaucan, Ana River, Silver River and Odell and Crescent Lakes Projects are under investigation. Large tracts of land may be irrigated through them. The making of stream measurement has kept up, in case it should be deemed advisable to take up this work in the future.

Stream measurements are being taken in the Rogue River Valley, and the government engineers will make an investigation there to develop an irrigation project. There is a great area of fertile land. Storage will be necessary, as the low water flow of the streams has been appropriated. In this valley are the towns of Grants Pass, Ashland and Medford. The average rainfall is 21 inches.

Washington.

The State of Washington is prolific of irrigation projects. A very interesting one among those proposed is the Wapato, through which 120,000 acres of land in the Yakima Indian reservation would be put under ditch and opened to settlement, subject to the rights of the Indians. The project is a very feasible one and the land is rich, but the Red Men must be considered and they have not yet been thoroughly convinced that they wish to relinquish any part of their holdings, although shown that they would reap a large financial gain. There are already canals in the reservation watering 17,000 acres. Two of these, covering 12,000 acres, were constructed with tribal funds and are maintained by the government. It is proposed to utilize the larger of these in the new system by enlarging it. Part of the plan is to use all the existing systems in connection with the one proposed by the government.

At present the land is held by the Indians in individual tracts of eighty acres. By an act approved last year authority was given for the disposition of surplus and allotted lands on the reservation. An allotment of $100,000 was made to provide for a closer survey, that a definite proposal may be made to the Indians, also to provide an adequate summer supply of water for the lands under cultivation at present.

About 200,000 acre feet of storage will be required under this project.

The proposed Kittitas Project embraces about 60,000 acres of good land, but the expense involved has caused its consideration to be deferred.

Under the Benton Project, formerly known as the Ledbetter, the irrigation of 210,000 acres near the mouth of the Yakima river is contemplated. Of this about 40,000 acres near the Columbia may be watered by pumping from that stream. A private corporation has been formed for that purpose, which will take this tract from the government project.

The Benton Project, as a whole, is a most inviting one, the land being fertile, the growing season long and transportation facilities excellent, but the large cost, $7,000,000, will cause this project to be deferred several years. The State of Washington had selected 55,000 acres of this land for reclamation under the Carey Act, but has done nothing further toward carrying out this reclamation.

Wyoming.

Through the proposed Lake De Smet Project in Wyoming something like 50,000 acres of land in private ownership, some of it irrigated, could be given a reliable supply. The lake would be used as a reservoir site and regulate the flow of Piney creek. The storage capacity of the lake would be 55,000 acre feet. There are other creeks from which water could be developed.

Poultry Pointers.

Don't lose your grip.

Think, as well as read.

Don't think you haven't time to put things ship shape. You haven't time not to do it.

Don't be afraid of wearing out too many brooms in the poultry yards. They are money well spent.

Build your houses on high ground. Then floors will not be damp and dangerous.

Get your eyes on the good layer and off the poor ones. The trap nest will tell you.

If the late chicks fail it's mostly your fault. Plenty of shade, fresh water and good, clean feed will push them forward.

Be kind. Kindness reduces the feeding cost and improves the yield.

Don't make the mistake of growing more poultry than can be properly housed.

It's the individual that counts—not the breed There is no best laying strain, it's what you make them.—Poultry Digest.

This Editor Doesn't Like City.

If you live in a large city you are lost. You are swallowed up by the ocean of people around you. You go down into the deep and that's the last of you, except perhaps an occasional bubble that may come to the surface near where you were last seen. There are so many people you can't escape drowning. You can't make friendships as you do in a smaller place, where the individual isn't entirely effaced by the mass. Society is not what it is in the smaller place, where the human element enters in altogether. In the larger place your comings and goings are not noted by your friends even, and never by the newspapers unless you are one of the high financiers or packing-house bunch. The births and weddings in your family are of no interest, outside your own flat, than are the wreaths of smoke curling up into the empyrean; there's no merry cowd of neighbors with their warm congratulations. The deaths bring little sympathy from the rumbling, rattling world outside; no sorrowing acquaintances who have stood by you through the long sickness; there is little or none of that evidence of loving kindness that comes from neighbors and real friends in a small city or town, where the dollar mark is not written so large and so indelibly on everything. It is a paradoxical law that where there are so many people there are fewer friends, and when you diminish the number to a frontier community where neighbors are miles apart, your friends are ready to take their lives in their hands for you.—Fremont (Ohio) Post.

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Swamp Drainage is Next Great Reclamation Work

BILL UNDER WHICH REDEEMING OF 50,000,000 ACRES OF RICH LAND HELD BY FEN AND MORASS WILL BE CARRIED OUT WILL PROBABLY BE PASSED ON BY NEXT CONGRESS

FOLLOWING reclamation of arid lands will come the drainage of swamp areas. As great as the work of reclamation is, that of swamp drainage is destined to be greater—not in the difficulty of the operation, for drainage is easier—but in the results attained, in the number of acres rescued to the farmer.

When the Reclamation Act was passed there was a protest on the part of river men of the East and Middle West and the people of the states where great swamp areas lay.

The men along the Mississippi complained that Congress should not provide millions for irrigation without providing more for the improvement of that waterway. The facts that all the money to be spent for irrigation would eventually be returned to the treasury and that no direct appropriation was made for the work, anyway, were called to the attention of the river men. They were told that if they could devise a scheme whereby the Father of Waters could be improved under similar conditions, Congress would gladly act.

Indians coming out of the Everglades in their canoes on the Miami River.

Eastern and Southern states declared that some provision should have been made for the reclamation of swamp areas. They were told at the time that help would be given them eventually if they would only be good. It looks as if that help were to come even sooner than expected. It is likely that the next Congress will pass a bill now before it, providing for swamp drainage, under the plan of arid land reclamation.

Legislation for Swamp Drainage.

At the last session of Congress Representative Halvor Steenerson of Minnesota, where there are extensive swamp areas, introduced a measure providing for the drainage of swamps. It embraced the main features of the Reclamation Act, with the wording changed to fit the swamp districts. This bill was referred to the House Committee on Public Lands on December 14, 1906, but it was never reported out of that committee.

On December 5 of last year Senator Frank P. Flint of California introduced a measure providing for swamp drainage and reclamation that it is hoped will be passed by the next Congress. It follows the lines of the Reclamation Act. Provision is made that "the proceeds of the sale and disposal of public lands in the states of Alabama, Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Ohio and Wisconsin, beginning with the fiscal year ending June 30, 1905, including the surplus fees and commissions in excess of allowances to registers and receivers and excepting the 5 per cent set aside for educational purposes, shall be used as a special fund to be known as the drainage fund, under the direction of the Secretary of the Interior in the examination and the survey for and the construction and maintenance of works for drainage or reclamation of swamp lands and overflowed lands, including lands in any of said states or in other states and territories in which swamp lands overflowed or other lands requiring reclamation by drainage are located."

As under the Reclamation Act it is provided that swamp lands may be withdrawn during investigation of proposed projects, and that lands may be located under the homestead laws, subject to the provisions of the Swamp and Drainage Act. It is provided that farm units shall be not more than 160 acres, the size to be determined by the Secretary of the Interior; that the cost of reclamation shall be paid in not less than ten annual installments and that the president shall set aside town sites in which ample ground for parks and public utilities shall be reserved.

UNITED STATES SENATOR FRANK P. FLINT, who introduced swamp drainage bill in upper house of Congress.

$2,000,000 Directly Appropriated.

The sum of $2,000,000 is directly appropriated by the Act to aid in carrying out its provisions. This will probably be used in making investigations and perfecting plans for drainage projects, and may be sufficient to carry some of the work to completion. When the bill is passed much swamp land will be located. Drainage is far less expensive than reclamation by irrigation. There are no expensive dams to be constructed or canals to be dug. The land redeemed is usually of the most fertile character and quickly seized upon by settlers. There is a great deal of the more open swamp land held in private ownership. This will be dealt with in the same manner as private land under the irrigation act.

The work of drainage reclamation will be in the hands of the existing service and will be merged with the irrigation work, so that the two will proceed virtually as one under the same officials and with the same corps of engineers. All the experience gained by men that are constructing the irrigation systems in the West will be brought into play in the redemption of the swamp areas. The passage of this drainage bill will be an indorsement of the policy of the Reclamation Act and the work carried on under it. The effect of this has been swift. The long fight made by the Western men has brought its boon to the East and South as well and these fortunate regions are to receive a vast benefit without a struggle.

It is estimated that there are in the neighborhood of 100,000,000 acres of these swamp lands in the United States. About 70,000,000 acres have been surveyed. Nearly all of the swamp districts would make first-class farms if reclaimed and in many of them is land as rich as any known.

Swamp Areas in Many States.

There is a mistaken impression that the swamp areas are almost entirely in the South. This is far from true. In the Red River Valley in Minnesota, for instance, there are extensive sweeps of land that produce the finest of grain but are subject to disastrous overflow. They are virtually swamp lands. It would be worth millions to the farmers in this valley if the lands were protected from flooding by an adequate system of drainage. Cut up into small farms, they would support a large population.

In Indiana and Illinois, in the Kankakee river basin, are 400,000 acres of rich swamp or bottom lands that are annually overflowed. Private drainage works costing from $100 to $150 an acre have redeemed some of these lands and they have been found to be worth the expenditure. It is estimated by the government engineers that the tract could be reclaimed as a whole for something like $10 an acre.

Sentinel cypresses of Lake Drummond in Dismal swamp of Virginia

In swamp area, Florida leads off with her world-famous Everglades, covering 7,000,000 acres. New Jersey and Virginia have vast swamp

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areas, including the storied Dismal Swamp. Illinois has the surprising area of 4,000,000 acres of overflowed land. There are 6,000,000 acres in Michigan and 2,000,000 in Iowa. In Minnesota there are surveyed swamp regions embracing 5,000,000 acres and great sweeps that are not surveyed. Arkansas has far-reaching swamp tracts that are susceptible of draining and contain very rich lands.

Everglades Full of Possibilities.

Great dikes in Holland, with which we are all familiar, have rescued wide areas of the richest agricultural land from the ocean and a great population is actually farming below the level of the sea on lands that were at no distant time submerged beneath the waves. The reclamation of the Zuyder Zee, which will bring into cultivation 1,350,000 acres of meadow land is contemplated. America has a simple problem with its swamp lands. It certainly does not take second place to Holland or any other foreign nation in the matter of engineering and carrying out mighty works of this nature. All that is needed is a start.

It would probably have been possible to have reclaimed swamp lands under the arid lands Reclamation Act, as drainage of lakes covering tillable lands has been carried out under its provisions, a notable instance of this being the lowering of the natural bodies of water under the Klamath project.

The State of Florida has long cherished hopes of reclaiming the Everglades and work was actually begun on the project, but in a small way. It is conceded that the work should more properly be done by the Federal Government. There is a drainage commission in the state and with the aid of Governor Broward, who is enthusiastic over the matter, initial steps were taken. Dredges were built and one launched. Litigation caused the temporary suspension of the drainage tax, and stopped the work. The Florida East Coast Railroad aided in it.

A large portion of the Everglades is still unsurveyed land. It would produce a great variety of crops between seasons, if farmed, being a tropical region. Winter vegetables are grown in profusion on the edge of the Everglades. Sometimes unusual rainfall prevents these crops by raising the water in the 'Glades. In the winter of 1905 trips into them by canoe were possible.

Seminoles Find Shelter There.

The Everglades are not entirely a mystery. Canoes are paddled through their expanse and there are islands at intervals, where the Seminole Indians, driven into this vast swamp, make their homes and cultivate crops. The pines that grow at the rim of the waste do not appear on these. Some white gardeners are appropriating islands for truck gardens. The Indians hunt and fish with canoes. There are myriads of alligators and the copperhead lurks there.

Contrary to the generally conceived picture, the 'Glades are not a miasmatic stretch of reeking, steaming, black ooze, where fever lies and the tangled growths hold death for the person that straggles into them. They are dreary and uninviting enough, but they are really higher than the sea. They are surrounded by a limestone rim, which makes of the area a sort of a saucer. This is fed by enormous springs that send up a constant flow of water. When it rains heavily, the breaks in the rim do not suffice to let the water out and it floods the region.

The whole of the 'Glades region is underlain with a limestone formation. The water from the springs is full of lime and evaporation causes this to be deposited on everything. There are usually several feet of vegetable mould over this bedrock. It makes a rich soil.

The Everglades are not unhealthy, says Dr. John Gifford, writing in Forestry and Irrigation. An objection advanced to carrying out their reclamation is noted by him. This is that it is claimed on the East Coast, that the lowering of the water table in the Everglades would remove the influence such a body of water exerts on the "northers" blowing across it. He says there may be something in this objection, but that opinions are very diverse. The planting of trees over the area, following drainage would probably more than counteract its effect. The water coming from the deep springs is warmer in cool weather and cooler in cold weather than the air.

Room for 2,500,000 Families.

To the south of the Everglades and stretching for miles toward Cape Sable is the Great Mangrove Swamp, certainly a black and forbidding region. Where the mangroves, often large trees, are accessible, they are cut and used for piling.

Director Newell and his consulting engineers have held conferences regarding the reclamation of swamp and overflowed lands and have mapped out tentative plans in anticipation of favorable legislation. The surveying parties have gathered much data, which is on file at Washington.

The Senate Committee in its report favoring the passage of the Flint bill estimates that operations under it would add $5,000,000,000 to the land values of the drainage districts and $1,500,000,000 annually to its crop values; that it would supply 2,500,000 families with homes and put a total of 12,000,000 people on the lands, that are now practically worthless. "It is safe to say," the committee continues, "that these families would spend $2000 each in houses, improvements and equipment. This would cause an expenditure on these lands of $5,000,000,000. An average family of five will spend $600 a year. That will mean to the business interests an increased trade of $1,500,000,000 annually."

Properly Work of Nation.

Continuing in its report, this committee says:

> These vast areas, right at the doors of our great cities offer an ideal opportunity for relieving the overcrowding of cities. Their nearness to centers of population is assurance that when made habitable they will in a measure turn the pendulum of population from the city back to the farm. On these farms there will be no isolation, no loneliness. The fertility of soil and the nearness to market assure dense population, with all the comfort and luxuries of the town and with the healthfulness and freedom of the farm.
>
> Nearly all of the lands cultivable in localities where moisture is supplied by rainfall are already occupied.
>
> The demand for lands is increasing every year by the natural increase of native born and by the addition of 1,000,000 foreigners annually who must be provided with homes. We are not making more land, but the population is constantly growing more and more and the demand for land is growing greater and greater.
>
> It is beyond controversy that our people must be furnished opportunity to secure homes. Every year this becomes more and more the nation's duty The greatest and noblest mission of any nation is to settle its citizens in comfort and plenty in homes of their own. The government has set itself squarely upon the work of making homes in the desert, and already the sage-brush plain has become peopled with homeseekers waiting the turning on of the water to engage upon the work of building an empire in a region long vacant and voiceless.
>
> National drainage is as important a work, and when undertaken will show equal benefits. Today our vast areas of swamp lands contribute nothing to the nation's wealth or happiness. They are a barrier to growth and development. South Carolina, North Carolina, Arkansas, Indiana, New Jersey, and many other States contain large areas of swamp and overflowed lands, the existence of which is a menace to human prosperity, health, and life.
>
> We have already reached that period of our progress when a study of the conditions of this uninhabited region is imperative, and when a policy of reclamation on the part of the government is demanded by all citizens who have the general welfare of the nation at heart.

The committee concludes with the assertion that it is simply a matter of fairness and justice for the national government to drain the swamp lands after undertaking the irrigation of the arid ones. It says that the work can be done well and completely by the Federal Government only and that where it has been attempted by localities it has failed altogether or has been but half done.

Throughout the World are Millions of Acres of Land Under Irrigation

TO those that take an interest in farming by irrigation, general information concerning the supplying of water to land throughout the world will be of interest and value. From figures gathered by eminent authorities it may be said that there are more than 70,000,000 acres under irrigation in India, Egypt, the United States, Italy, Spain, France and the Argentine and some additional millions in China, Japan, South America, Algeria, Australia and other foreign countries, all but a comparatively unimportant proportion of this being in the two Asiatic lands mentioned, from which correct statistics are hard to obtain. Of the first group named there are under irrigation in India, the greatest irrigation country on the globe, 40,000,000 acres, in Egypt about 6,000,000 acres, United States near 10,000,000 acres, Italy 5,000,000, Spain 5,000,000, France 500,000, Argentine 4,000,000.

In a very valuable work on "Irrigation and Drainage" written by Professor F. H. King of the University of Wisconsin, he says that in the Po Valley in Italy there is the most intensive cultivation. In a distance of 18.5 miles he saw water being put on 100 fields of maize by as many different owners, some of the farms being as small as four acres. In Sicily and Southern Italy nearly all fruit culture is carried on by irrigation. Irrigated orchards are in a ratio of 15 to 1.

Irrigation has been practiced in Spain since Roman and Moorish times, at least. Artificial watering of lands began in France at an early date. The government is taking an active part in the work. As early as 1863 it appropriated $122,000 as a loan to help construct the Forez canal, fed by the Loire river and watering 65,000 acres. This water is served once each week through pipes. The land under this system has increased from $44 to $300 an acre.

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1	24	510	800	870
1	24	650	740	895
1	24	500	760	785
	Average	558	748	833

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Ditches in High Mountain.

The mountain streams and rills of Switzerland are utilized for the watering of meadows. Professor King was surprised to find that even so high up as the south side of the Simplon pass, meadows were irrigated by waters that came from snow fields still higher up. In Belgium there is a network of canals with an aggregate length of 350 miles, constructed both for navigation and irrigation. This water is taken upon sandy soil that was utterly unproductive before its advent, but now grows good crops of hay. In Denmark 22,000 acres of land have increased $80 an acre through the construction of canals.

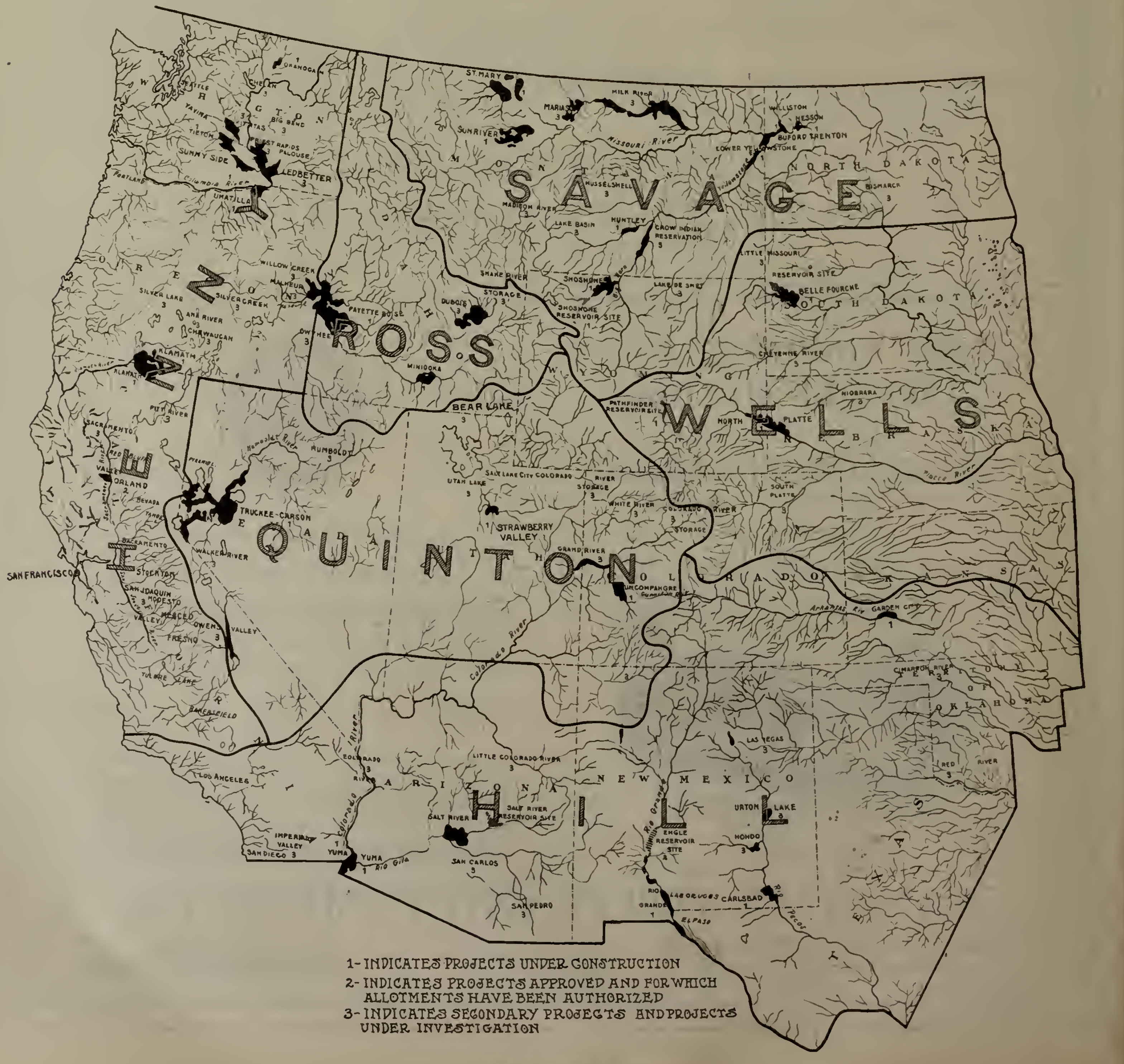
Crude reservoirs and natural waterways are used in irrigating in Austria-Hungary; in some valleys of the Tyrol; in the Bistritz Valley and in the Valley of Elbe in Bohemia. Water wheels are found along the streams in many places. They are used in irrigating small meadows. About the large cities small gardens are irrigated by pumps. In the mountain regions of the Tyrol some of the works are very ancient. In parts of Bavaria, meadow irrigation is common. In a little more than a mile at one place twenty wheels may be seen.

There are meadows in England that have been irrigated for so long a time that all record of the origin of the systems has been lost. It is thought that Roman engineers directed the construction of some of them and that perhaps they were an inspiration from the Netherlands.

It is in India, though, as already intimated, that the world's greatest artificial watering of lands is to be found, though some may claim that distinction for China. Here irrigation has reached its highest mark. The magnitude of the reclamation of unwatered lands is so stupendous in this section of Asia as to make the efforts of this country and even Egypt, great as they are, small by comparison. From Lahore, in the northwest, to Calcutta, in the southeast, a district 1400 miles long and averaging 100 miles in width is largely under irrigation. Passing other systems, mention should be made of the immense dam at Bhutan, 4067 feet long and 130 feet high, the reservoir behind which supplies the Nira and other canals. The Vir weir at the head of the Nira canal helped give the pattern for the great Laguna dam at Yuma. It is 2340 feet long with a maximum height above the river bed of forty feet. Over the crest pours a maximum of 160,000 cubic feet of water a second, the sheet being eight feet deep.

Wells Serve Two Million.

It is estimated that in the Madras Presidency in India there are at least 400,000 wells that serve 2,000,000 acres. Of shallow wells there are estimated to be in the Indian Peninsula, British and native, 300,000, which give water to more than 6,000,000 acres of land, some of the farm units being about large enough for the American



Map of the Reclamation Territory.

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farmer to feed his family cow on. This shows what a tremendous population irrigated land is capable of supporting at a pinch.

The Ganges system is one of the most stupendous in India. There are 1000 miles of main canal fed by the Upper Ganges, with 4000 distributing ditches. There are seventeen big dams. About 1,500,000 acres are fed. The lower Ganges feeds 600 miles of main canal and has 2000 distributaries. About 750,000 acres are watered.

In the Punjab and Sind there are works constructed in the twelfth and thirteenth centuries that are still in part use for the irrigation of lands. The great famine of 1831-2 caused extensive improvements to be made. So vast were the extensions that the Indian government received from the lands covered by them, as far back as 1890, $96,000,000. Vast sums have been spent in the work of reclamation under the authority of the British government.

The native, or independent states of India, comprising two-thirds of the peninsula, have established large irrigating systems at great cost. The total of money spent in all India upon this life-sustaining work and the number of acres reclaimed both reach vast figures—run into millions. It is a stupendous watering of parched lands, an example for the whole world to view and admire—though of course the rest of the world hasn't the same water supply and the same areas of land to carry water upon. Perhaps America can approximate it.

Reclamation Work in India.

Just a little more about this tremendous reclamation work in India: There is in that country an area of 1,000,000 square miles, no portion of which could be deemed secure against famine from the uncertainties of the seasons without the saving grace of irrigation. Consul-General Michael of Calcutta says that to make India absolutely safe from famine, 35 per cent of the land should be brought under water. This means an area of 74,000,000 acres. This presents a difficult problem, but Mr. Michael says that what is already accomplished is ample guaranty that it will be solved. Present plans when carried out will increase the irrigated area 15 per cent, bringing it up to about 60,000,000 acres, or but 14,000,000 less than the total amount necessary to forever lay the specter of starvation in that country. The expenditure for this almost incredible undertaking is estimated at $2,400,000 annually. This is a cheap price to pay for the ending of famine, but besides it is known that all the larger of the existing systems in India pay their way, and some yield the government a large profit. The Cauvery and the Guadavary systems in Southern India irrigate 1,000,000 and 750,000 acres respectively and pay respective profits of 33 and 15 per cent on the money invested.

And from that country are coming requests for scientific aid from our Reclamation service. The great results there show what may be expected in the United States. That irrigation is a blessing is proclaimed by venerable India.

In the Island of Ceylon there exist perhaps the most interesting relics of ancient irrigation systems. There is on this island the ruins of one of the largest artificial reservoirs ever constructed. The British government is persistently at work rehabilitating the old systems and adding new ones. There were found more than 5000 ancient reservoirs. One king is said to have constructed in the twelfth century 4770 tanks or reservoirs and 543 great canals. Up to ten years ago the British Government had already restored 2250 of the small and 50 of the large water storage basins and had constructed 245 weirs and 700 miles of canal.

Australia is perfecting some irrigation works, but the development of this art there has been slow. In New South Wales there were in 1891 not more than 3000 acres under water. Victoria has completed works that serve half a million acres. The government has sunk artesian wells in Queensland, which have proved successful. The irrigated area is increasing in these colonies.

In China the use of water for irrigation passes almost beyond the bounds of statistics and computation, as do so many other physical facts in the economy of that mysterious nation, or world by itself. There water is used on every bit of land that it can be taken to and so intensive is the cultivation that in Southern and Central China it is estimated that from three to five persons live upon one acre. The great canals were laid out primarily for transportation. Owing to the primitiveness of the people in the great farming districts and to the fact that holdings are so small, the methods used are in some cases extremely crude and laborious. A large part of the water used on the gardens and rice fields is raised out of the canals with a rude chain, or rope pump worked by hand or with oxen, and in some cases it is even carried with buckets on a yoke placed on the farmer's shoulders.

Japan Has Irrigated For Centuries.

Japan has been a country of irrigation through centuries. Of the 12,500,000 acres of land that support the population of 41,000,000, two-thirds or about 8,000,000 acres are artificially watered. Our 10,000,000 acres of irrigated land are held by 1,000,000 persons, giving each owner forty acres and four to a family.

In Siam, one-half of which is under cultivation, four-fifths of the farming is done under artificial ditch. Canals branch out from the rivers in all directions. The main carriers are built by the government and the ditches supplying the fields by the farmers.

Throughout the rest of Asia irrigation is carried on on a varying scale, mostly by private enterprise. Statisticians have been unable to gather a correct estimate of the total exent. In Corea, in Afghanistan and parts of Russian Central Asia, there are isolated private works that serve, together with those in Asia Minor and Central Asia, a vast area in the total. Irrigation is practiced in Thibet and far up in the sky, on the Pamir, 12,000 feet above the sea level.

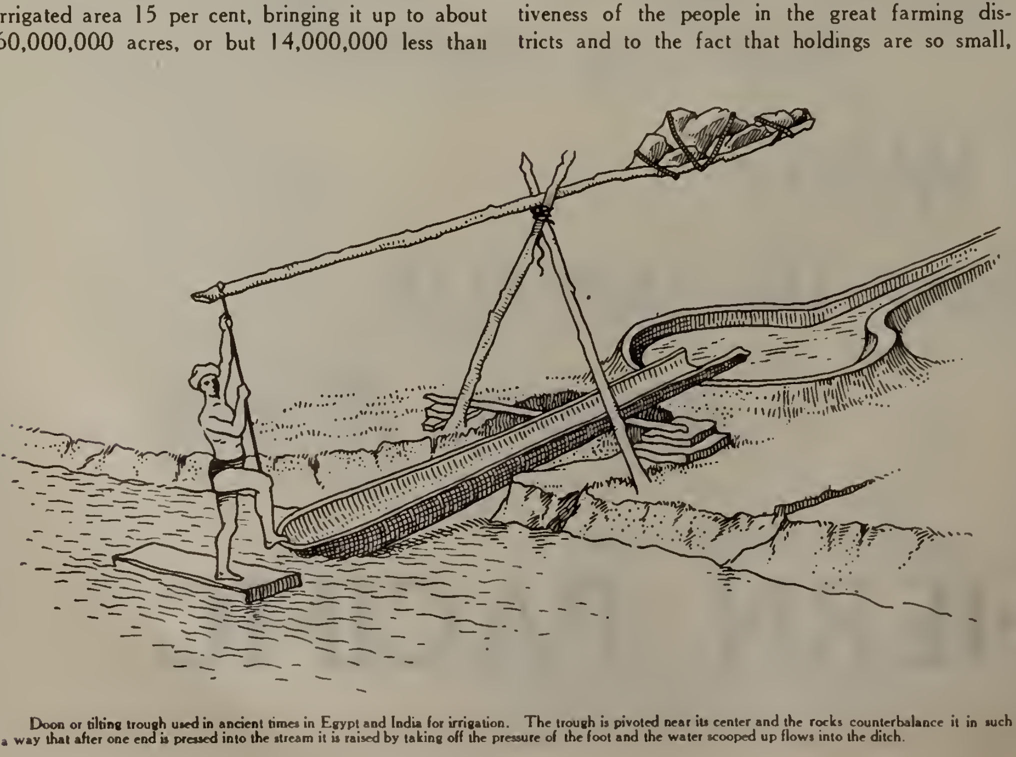
The extremes resorted to in some places to obtain water are illustrated in Armenia, where a series of wells are dug on a steep slope and their bottoms connected with a tunnel to form a stream. Each stratum of water is thus tapped. Some of the uppermost wells are 100 feet deep. This same method is adopted in ports of Afghanistan and Cashmere. In the Algerian Sahara artesian wells have proved successful since the first one was sunk in 1848. Some beautiful oases have been the result. These waters carry nitrates and fertilize the desert soil so that it produces in wonderful abundance.

Palmy Days of Egypt.

Egypt, it is said, once supported a population of 20,000,000. Irrigation and cultivation were in those days at their highest stage. The British government is doing wonderful work in further utilizing the waters in that country, the great Assouan dam being one of the engineering marvels of the world, though surpassed by the works at Roosevelt. There is a strange supply of fertilizing material in Egypt. The absolutely dry climate has preserved the waste of the millions that occupied ancient towns and villages and this is being dug up by the inhabitants today, to enrich their lands.

Irrigation is coming to the front in Cape Colony, some extensive works having been established. Madagascar on the east coast of Africa is irrigated to some extent and Madeira on the west coast has extensive works covering more than one-half of the Island. The richer farmer has his own reservoir, in which he takes his share of water and uses it as he deems wise. The poorer one is unable to make the best use of what he gets, and suffers some hardships.

For antiquity of the practice of the art of Irrigation America stands abreast of Egypt, perhaps. In Arizona, Colorado and New Mexico, and in Mexico, Central America and Peru are remains of irrigation systems whose origin is lost



Doon or tilting trough used in ancient times in Egypt and India for irrigation. The trough is pivoted near its center and the rocks counterbalance it in such a way that after one end is pressed into the stream it is raised by taking off the pressure of the foot and the water scooped up flows into the ditch.

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in the departed centuries. In Peru especially, the early Spanish invaders found elaborate irrigation systems laid out and many of them still in use by the people. Prescott says that water was conveyed by means of canals and subterraneous aqueducts executed on a noble scale. "Large slabs of freestone were used in lining the artificial waterways. The canals were brought from some lake or natural waterway in the heart of the Andes. One traversing the district of Condesuyos was between 400 and 500 miles long. Obstacles of mountain, gorge and marsh were overcome by these primitive but solid builders. Lack of care has permitted a large part of these ancient but valuable works to fall into ruin and now they must be repaired at great cost."

In Hawaii irrigation is being extended. The yield of sugar has been increased from two to four tons per acre by artificial watering. Around Pearl Harbor artesian wells have proven successful, many thousand acres of rice and bananas being watered by them.

Intensive Farming in Java.

In Java there is extensive irrigation. Arthur Wallace, a traveler, says that in the island of Lomock, to the east of Java, there is the most surprising exhibition of intensive farming in the world. The wonderful systems of cultivation seen by him there equaled anything written of Chinese agricultural marvels and surpassed anything of the sort to be seen in Europe. "Many hundreds of square miles of irregularly undulating country," he says, "have been so skillfully terraced and leveled and permeated by artificial channels that every portion of it can be irrigated and dried at pleasure."

The Argentine Republic, abreast of the world's progress, is bringing large areas under cultivation. The works begun years ago have perhaps reclaimed about 4,000,000 acres by this time and the total is probably much in excess of that figure.

The lessons gained from a survey of the facts concerning irrigation in other parts of the world are an inspiration to the American farmer, especially to those pioneers who are to take up residence under and bring into their full greatness the projects undertaken by the United States government. In all parts of the world, it will be seen the artificial watering of lands is looked upon as the permanent and certain source of the greatest agricultural wealth. Where methods of the closest industry and attention have been practiced, the results on artificially watered lands have been splendid to contemplate. One of the most remarkable features of farming under irrigation is the great capability that watered land has to support human life. One acre to the family, as in China and some other parts of Asia, we will hope need never be the allotment here, but it gives an inspiration by showing how much may be expected of from ten to forty acres of good land, well watered. If the farm unit under the United States projects were even four acres, the size of many of the farms in the Po Valley and other parts of Europe, a little figuring would soon give an estimate of how many families and how many people the area that this country is bringing under reclamation would support. And under many of the American projects it will be found that only five acres, properly tilled, will support a considerable family in comfort, and that ten acres will in many instances be a considerable farm, as far as revenue is concerned.

Farmer Should Keep Posted.

The importance to the country of this great work of Reclamation should be realized by all the people and every encouragement should be given the government in carrying out its present projects and in planning and completing others. Settlers especially should strive to make the most of the opportunities given them and by industry render fruitful the regions that water is brought to. More of study, observation and experiment is needed to bring success in the irrigated regions than on the larger ranches, where crops are not greatly varied and require only ordinary methods of care.

The farmer under the canals must use intelligence. He should keep up perhaps with what is being done with water in other parts of the world, gaining what he can from the experience of these cultivators who have brought the greatest returns from the soil. Following a routine and not being alert for new ideas, for new crops that are moneymakers may lose much to him. Those great tutors, the government experiment stations and the Agricultural colleges of the various states, are constantly issuing bulletins of guidance on all matters essential to the grower. They should be kept up with.

The farmer should read. He should become a scientist in his own line. None has better brains than he, none a clearer mind. In knowledge there is wealth for him. He already holds the power in the land. He is the backbone, the prop of all prosperous countries. There is just as much to be derived by him from the scientific study of the soil, of horticulture and agriculture, as the professional man and savant of the city derive from their research and investigation. The scientific farmer on irrigated lands is always likely to be a prosperous one.

Scope of the Irrigation Congress is Growing Yearly

FIFTEENTH SESSION OF GREAT NATIONAL BODY, FORUM OF FARMER, AT SACRAMENTO, DEALS WITH MANY IMPORTANT SUBJECTS THAT ARE OF INTEREST TO ALL THE PEOPLE

EACH year the Irrigation Congress seems to grow in scope and importance until from the small gathering at Salt Lake City in 1891 it has become a body of great national importance and influence, attended by the thinking men of the country and dealing with the many subjects before it in a thorough and vigorous manner. From a handful of delegates at the first session of the congress the representation has reached the 2000 mark. Men of note, not only from this country, but from abroad attend the sessions. Cities of the West vie for the honor of being the meeting place. The plan of holding an exhibit of irrigation products at the congress has resulted in its assuming the nature of an exposition also.

The Fifteenth Irrigation Congress, that sat in Sacramento in September, was the greatest of all. The citizens of California's capital city had made every preparation to entertain the delegates and other visitors and it put on gala attire that was striking and beautiful. It is seldom that more attractive electrical decorations are seen. Two main business streets were virtually roofed with glowing bulbs and from these canopies were suspended at intervals the names of the various States of the Union in colored lights. A windmill of the style of Holland, trimmed with electric globes, was a striking feature. Mottoes applicable to irrigation were suspended here and there. Music was everywhere.

Grand Allegorical Parade.

On the night of the closing day a grand illuminated allegorical parade was held. There were numerous beautiful floats.

The convention was held in a large frame and canvas structure erected next to the Agricultural Pavilion on the State capital grounds. The accommodations were splendid and comfort was enjoyed by all the visitors and delegates. The exposition of irrigation products, in which several States took part, was next this. One of the features of the congress was the singing of the Ogden Mormon Tabernacle choir of 200 voices.

It might be said that this gathering at Sacramento was more than a congress. It partook also of the nature of an irrigation jubilee, celebrating the work that has been done by the Reclamation Service. Many of the officials of that service were present, Director Newell among them. President Roosevelt sent a letter and Vice President Fairbanks attended in person and made a speech.

Many Subjects Dealt With.

The subjects discussed and dealt with showed the growing scope and widening sphere of influence of this institution. Though politics were decried, discussions of subjects that had to do with national policy were indulged in. Many matters not wholly within the scope of irrigation, but allied to it, were considered. The tariff on sugar sent from the Philippines held the attention of the assemblage for a time, the question being one of importance to the growers of sugar beets, produced extensively on the irrigated lands. Forestry came in for the attention due because of its own importance and its close affiliation with irrigation. The decision of the Department of Agriculture that the sulphuring of California dried fruits should cease was another matter that was taken cognizance of, a resolution that the ruling be modified being adopted. Grazing regulations on forest reserves, railroad transportation and natural waterways and conservation of resources were dealt with. The resolutions embraced many subjects outside of the mere reclamation of lands.

Scope of Congress Broadening.

The scope of discussion and resolution shows that the Irrigation Congress is gradually becoming the forum of the farmer of America—the gather-

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480 acres in hay, grain and alfalfa; 200 acres in bearing apples, pears, plums and peaches. The first fruit trees ever planted in the Valley. The rest of the ranch is used for pasturage now, except 160 acres in timber. The wood is worth $4.00 a cord.

Main branch of Carson flows through place and water in abundance all over at from seven to twelve feet. Soil, sandy loam, with average depth of six feet and rests on quicksand. Anything grows except tropical fruit.

See Further Description in Nevada Section of this Publication.

ing through which he can make his wants known and voice to the nation whatever protests he has. It is a potent medium through which he can knock at the door of Congress with a pretty loud knock. Men of the cities seeing the great figure that this congress is destined to cut in the affairs of the nation are joining in its deliberations. Some of the brightest minds, both from urban and agricultural communities, lend brilliancy to the sessions.

While the attendance of delegates was larger than at any other session of the congress and the number of visitors also large, making this session itself a complete success, there was an unsatisfactory representation of exhibits at Sacramento on the part of the irrigated sections. California was not allowed to compete for the prizes—worth $20,000—the most valuable ever given at a congress. There were $10,000 worth of these left, which will be donated to the next congress. Oregon, Utah and Idaho had the main exhibits. .

Even From Syria They Came.

Among the delegates present was P. A. Behannerty, president of the Syrian National Labor Association and of the Agricultural College of Mount Lebanon, Syria. He was dressed in native costume and made a speech. Sun Sze Yee, Chinese Vice Consul at San Francisco, and Owyang King, Vice Consul, represented China. Owyang spoke for his chief who does not understand English. He declared China to be a pioneer in the work of irrigation. This was not disputed. Franz Bopp, Imperial German Consul-General, delivered an address in behalf of his country. Mexico was represented by five delegates. Andros Aldosora, subsecretary of the Mexican Legation at Washington, their leader, spoke in behalf of that Republic.

The consideration of the resolutions finally adopted by the congress produced many lively tilts among members of the committee. Some of them were not passed upon favorably until after warm debates by that body. Some were rejected.

An exchange of ideas between Governor Chamberlain and E. H. Harriman, the railroad magnate, created laughter and also food for a good deal of thought. The railroad man had the assemblage with him for the moment, and his witty rejoinder to the Oregon Governor was one of the diversions of the session. His remark that the railroad corporation was "holding its Oregon timber lands for the benefit of posterity" was gravely pondered upon, however, by thinking delegates after the diversion had passed. Governor Chamberlain accused the railroads of withholding these lands from settlement for mercenary motives and retarding the advance of the State.

FRANK C. GOUDY, President National Irrigation Congress that will convene at Albuquerque.

Tariff Resolutions Are Tabooed.

The discussions on the proposed resolutions to take the duty off lumber and off sugar were exciting, especially the former. The congress decided to adopt neither, on the ground that to do so would be treading on political ground, a precedent that would be fraught with danger to the institution's future.

There were about 2000 delegates in attendance at the congress and as many other persons attended most of the sessions. There were thousands of visitors in the city. The proceedings created the deepest interest and papers and speeches were listened to with attention.

Excursions were run to many points and the delegates and others were given opportunity to see the irrigation projects with which California is ringed, the Yuma on the Arizona border, the Truckee-Carson on the Nevada border, and the Klamath on the Oregon border, besides the smaller one at Orland within the State.

The officers of the congress were: President, George E. Chamberlain of Oregon; First Vice President, John H. Smith of Utah; Second Vice President, H. B. Maxson of Nevada; Third Vice President, George E. Barstow of Texas; Secretary, D. H. Anderson of Illinois.

Complaints From Various Sections.

One of the features of the congress, termed by it an effort to discredit the Reclamation Service in the interest of corporations, but declared by those making them to be a demand for justice, was the complaints made by a few people in the Yuma district, in the Imperial Valley and Owens Valley. They had hard work getting their troubles before the congress at all and they were not looked upon seriously, all the prominent irrigationists declaring that the criticisms of the Reclamation Service were unfounded. The resolutions committee refused to recognize the complaints formally. However, the "kickers" will probably be seen at Washington during the next session of the National Congress, asking for an investigation.

Farmers under the Truckee-Carson project, while making no complaint against the service, asked for some material changes of the Reclamation law. They desire that the time of payment for water rights begin five years from the time water is first furnished and that the installment period shall be twenty years;, that a probationary one-year extension be allowed at any time to provide for unseen contingencies and that an independent local arbitration board be provided to settle disputes.

Albuquerque, New Mexico, was chosen as the meeting place of the congress next year. Among the resolutions adopted was one calling for the holding of the session of 1909 in the city of Washington.

Though nearly everybody in Sacramento worked hard for the success of the congress especial commendation was bestowed upon George W. Peltier, chairman of the board of control; W. A. Beard, chairman of the executive committee, and Samuel Fortier, chairman, and L. G. Sinnard, secretary, of the publicity committee.

For the first time in the history of the congress a woman was chosen to be an honorary vice president. This honor was conferred upon Mrs. Lovell White, the California delegation selecting her as the representative in that capacity of this State at the next congress.

GOVERNOR GEORGE C. CHAMBERLAIN, of Oregon, President of Fifteenth Irrigation Congress. Photo by Bushnell.

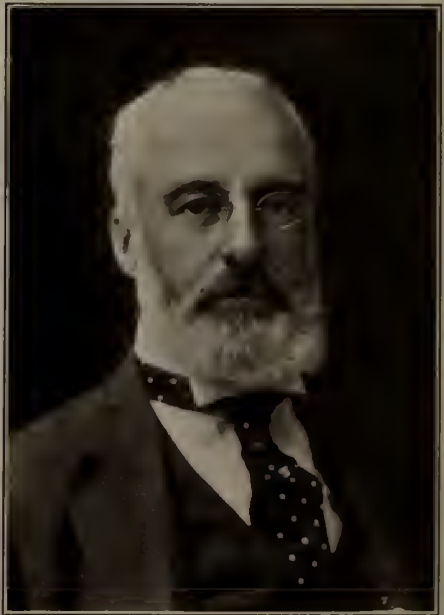
Officers of the Congress.

These are the officers elected at this congress for the next gathering: Frank C. Goudy, of Denver, President; B. A. Fowler, of Phoenix, Ariz., Secretary; George E. Barstow, of Barstow, Texas, First Vice President; Judge John E. Raker, of Alturas, Cal., Second Vice President; Herbert E. Strain, of Montana, Third Vice President.

There was a Roosevelt strain throughout the congress and the administration was given full support, as evidenced particularly by the failure of the anti-lumber tariff resolution and that urging the retention of the duty on Philippine sugar.

The Resolutions Adopted.

There were many recommendations of indorse-



HON. GEORGE E. BARSTOW, Barstow, Tex., First Vice President Sixteenth National Irrigation Congress and President National Drainage Association. Photo by Bushnell.

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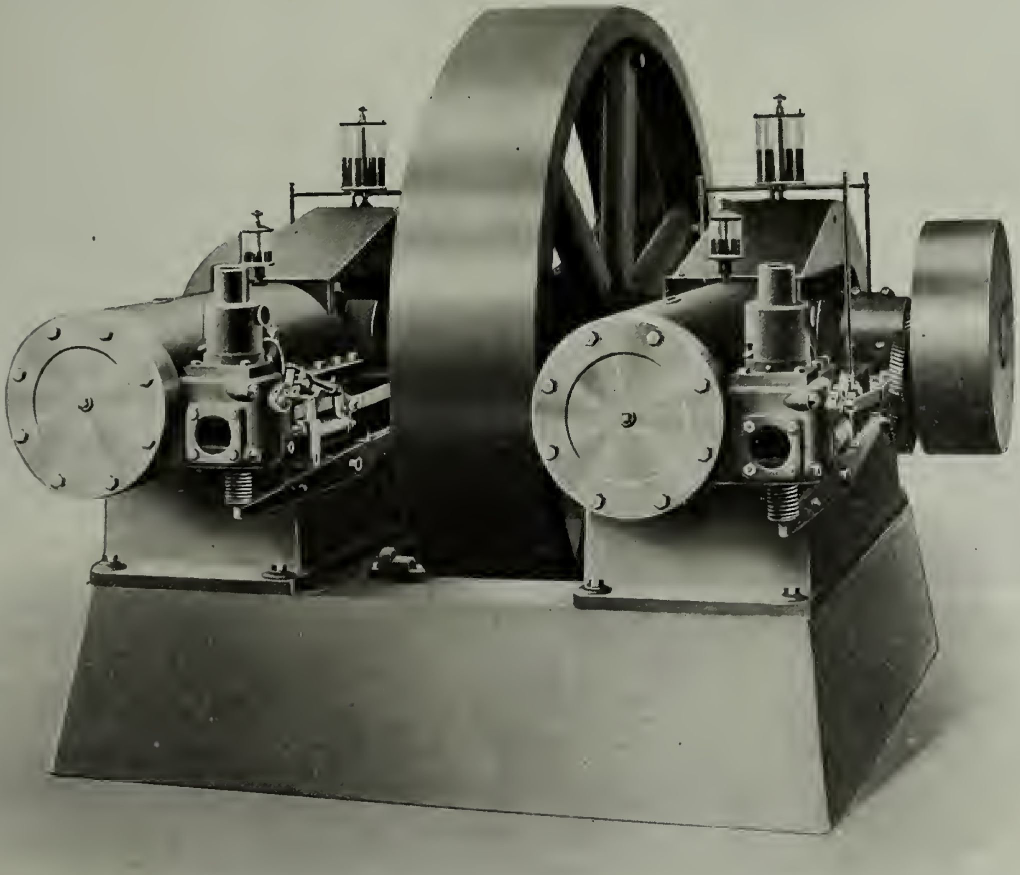

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ment and approval. Of the others, the most important that are not mentioned elsewhere are the following:

Urging the government to "select in the watersheds of San Joaquin and Sacramento Valleys the most available sites for reservoirs for the storage of water, to the end that disastrous floods may be averted and the water of the streams stored and utilized for agricultural, mining and transportation purposes," and requesting that suitable lands be selected on which to deposit the detritus from torrential streams, both in the interest of the mining industry and the navigation of the streams.

Asking the government to acquire by exchange or otherwise the Calaveras grove of sequoia gigantea will be one of the urgent appeals to the federal congress.

Urging the various states and territories to enact laws for the protection of the government and the private irrigation works; commending the efforts of the national rivers and harbors congress to awaken the American people to the value of the national arteries of commerce.

Urging the national congress to make adequate appropriations for improving inland waterways.

Recommending that the president of the irrigation congress appoint a committee of 15 to attend the rivers and harbors congress at Washington in December.

Recommending that congress make appropriation for continuance of the work of the geological survey in investigating water resources or the creation of a bureau of hydrology instead.

Favoring assistance by the federal government in the work of the National drainage association.

Requesting the enactment of a law providing for inspectors in the forest service who shall have the power to summon witnesses, administer oaths, and take testimony in investigations of any alleged forestry wrongs.

· Favoring the creation of a federal drainage bureau recommending the transfer of the care of the national parks in the western states to the forestry service.

Urging treaties with Mexico and Canada; that the reclamation service can build and operate canals across their territory.

Recommending that the government sell its lands only to actual settlers.

Urging that the desert land act be amended so that only 160 acres can be entered on instead of 320, as at present.

Urging that the prices for timber and grazing privileges in national forests should not exceed the cost of improvements and care thereof.

Declaring that the conserving of all the natural resources shall be the policy of the irrigation congress and urging the national government to adopt the same.

Urging the State of California to authorize the state board of forestry to examine watersheds and regulate timber cutting.

Urging enactment of laws providing that no man shall have a right to use his property in a manner inimical to the general prosperity, and recommending legislation to regulate the use of privately owned property so that wasteful destruction of forests and natural resources may be stopped.

Among the prominent officials of the Reclamation and the Forestry Service and irrigationists of note that made addresses before the congress or read papers were:

1---John Henry Smith of Salt Lake, First-Vice-President Fifteenth National Irrigation Congress.
2---Judge J. E. Raker of Alturas, Cal., Vice-President Sixteenth Irrigation Congress.

3---D. H. Anderson, Chicago, Secretary Fifteenth Irrigation Congress. --Photo by Bushnell
4---B. A. Fowler, Secretary Sixteenth Irrigation Congress. ---Photo by Bushnell
5---W. A. Beard, Chairman Executive Committee Fifteenth Irrigation Congress. ---Photo by Bushnell

Governor Chamberlain, the president; Chief Forester Gifford Pinchot, Dr. Elwood Mead, Professor Samuel Fortier, W. A. Ward, Governor Kibbey of Arizona, Ex-Governor Pardee of California, A. C. True, W. J. McAllister, L. L. Dunnett, C. M. Mott, W. M. Coward, Congressman Needham, Judge John Raker, James H. Brady of Idaho, Mineralogist Lewis E. Aubury, Judge Frank H. Short, W. A. Beard, George W. Peltier, Governor Mead of Washington, Governor Cutler of Utah, Senator Perkins, Arthur H. Briggs, Merle B. Vincent, E. A. Sterling, chief forester of the Pennsylvania Railroad Company; A. F. Potter, chief inspector of grazing for the United States; F. William Rane, Forester of Massachusetts; George Eames Barstow, president of the National Drainage Association; Albert F. Wood, United States Department of Agriculture; E. T. Allen, H. D. Loveland, George Otis Smith, director of the Geological Survey; W. T. Cressier, Governor Gillett of California, Congressman Smith of California, Frank C. Goudy, David Lubin, Judge Nave of Arizona, John Henry Smith, apostle of the Mormon Church; Senator Newlands, John A. Fox of Arkansas, Dr. W. J. McGee of the United States bureau of soils, J. A. Holmes of the Interior Department, M. O. Leighton, United States hydrographer; Morris Bein, White Smith, Leicester C. Hall, and many others.

The interest that United States Senator George W. Nixon is taking in irrigation matters was noted by the members of the Congress. Though his fortune has been made principally from mines, Senator Nixon is an enthusiast in the irrigation cause and his assistance will cut a considerable figure in the furtherance of reclamation.

Opening of the Assemblage.

The features of the opening session of the congress were the enthusiastic greetings extended to Vice President Fairbanks, the address of Governor Chamberlain, the voting of a resolution of thanks to President Roosevelt for his efforts in behalf of irrigation, which was productive of loud cheers; eloquent welcoming addresses by Governor Gillett, Mayor Beard, Senator Perkins and Arthur H. Briggs, president of the California State Board of Trade; the reading of a message of greeting from President Roosevelt to the congress by Chief Forester Pinchot, the Chief Executive's personal representative at the gathering, and speeches by Governors Mead and Cutler and the foreign representatives.

The message from President Roosevelt was as follows:

To the Officers and Members of the National Irrigation Congress, Sacramento, Cal.—Gentlemen: I send you hearty greetings and my earnest wishes for the fullest success of your convention. I congratulate you on the progress of the great movement you represent. There is no movement more emphatically for the benefit of the small farmer and the small ranchman. There is no other way to assist the actual settler and home-maker who owns and tills his own land so powerfully as through this movement of yours for the wise use and preservation of the waters and the forests. The reclamation service and the forest service are directly adapted to help the small man make and maintain a prosperous home; and they are doing it. These services were recently inspected on the ground by the Secretary of the Interior and the Secretary of Agriculture, who have them in charge, and I congratulate you on the high standards of integrity and efficiency they have attained.

It is a matter of sincere satisfaction to learn that you will not confine yourselves to questions of irrigation and forestry, nor even to the control, use and conservation of streams, vastly important as these are to every citizen of the United States. I am glad to know that you will give attention also to that problem of which forestry and irrigation and water conservation form but a part, the fundamental problem of the conservation of all natural resources. The work of the government along the line of this greater problem can not be made effective without the approval and support of the whole body of citizens. By educating, guiding and crystallizing public sentiment in this direction, by bringing the needs of the people clearly and forcibly to the knowledge of their representatives, you are rendering a service of the first importance to the nation as a whole.

THEODORE ROOSEVELT.

Governor Chamberlain denounced land grabbers, whom he designated bluntly as "thieves." He advocated that the National Congress take steps for the recovery of the stolen land. He proposed that lands that had been stolen and title acquired beyond recall be placed under a graduated tax that would make it unprofitable for the corporations or individuals to hold them. "Let the government exercise the right of eminent domain for the people, instead of the corporations," he said, and continued:

Millions of acres of valuable lands have been stolen by the railroads and corporations. This congress should call the attention of the people to the land looting and we should also propose that these areas be recovered by the government and placed at the disposal of home builders. All fraudulent entries should be canceled. It is not too late, and the government should act. The land thieves should be handled without gloves.

Governor Chamberlain made these suggestions in the way of legislation for the recovery of such lands:

I have given the matter of holding of large grants of land by corporations, which refuse to sell, some consideration, and there are several ways to attempt to reach the evil through appropriate remedial legislation.

First—In cases where by the terms of the grant the corporation is compelled to sell to applicants who are actual settlers, the machinery of the federal courts should be set in motion to compel sales to be made at suit of a would-be purchaser. If additional legislation is necessary, let congress be appealed to to enact it. One thing is certain, and that is the government must take the initiative and bear the brunt of the litigation, because no single individual who makes application in good faith to purchase can litigate with the corporation.

Second—In cases where the grant does not in expressed terms compel a sale, congress might pass an act providing for condemnation and payment to the corporation of a just compensation. What higher and better use could be made of the exercise of the right of eminent domain than to exercise it in favor of the people to themselves?

Third—Corporations, whether organized for building railroads or wagon roads or any other pupose where the buying and selling of lands is not the primary object of their creation, ought not to be permitted to hold other than is absolutely essential for immediate use.

Referring to the recent decision of the United States Supreme Court in the case of Kansas against

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Colorado in relation to rights to the use of water, which carries with it the dictum of Chief Justice Brewer casting a doubt on the right of the government to reclaim lands held in private ownership, the Governor said he hoped the next Congress would take up the question involved and create laws that would remedy any existing defect, that reclamation might in no way be hindered.

Vice President Fairbanks, in making his speech, digressed to refer to Governor Chamberain's remarks about timber lands. He advised a more conservative course than that suggested by the Oregon Executive.

Fairbanks Talks of Work.

The Vice President expressed pride in the part he had taken in bringing about reclamation legislation and said that the marvel was that the virtues of such legislation had not been foreseen earlier and the act adopted sooner. Mr. Fairbanks continued as follows:

> There is no more important subject for the consideration of farmers in many of the humid and semi-humid regions than that of so-called supplemental irrigation. We must prepare more and more for the increased demand upon our food supply which comes with the multiplying millions of our population.
>
> One of the most promising things in the extension of irrigation is the development of the beet-sugar industry. This is a subject of not mere local importance. We are sending abroad more than one hundred millions of dollars a year for sugar. This enormous sum goes to the enrichment of sugar producers in foreign countries. This is an unwise policy and should not be continued forever. By pursuing a rational course we can produce from our own soil and refine in our own factories all of the sugar needed for our use. It is readily to be seen that the cultivation of sugar beets in the arid and semi-arid regions will be a source of unfailing and expanding wealth in the future.

VICE-PRESIDENT FAIRBANKS addressing Irrigation Congress at Sacramento. Prominent advocates of Irrigation on platform. ---Photo by Bushnell.

> Closely related to the subject of irrigation is the work of forestry preservation. We have pursued a somewhat reckless policy with regard to the forests of the United States. In some sections of the country, in fact, in almost every section, we have denuded our lands of timber in what now seems to have been almost a wanton fashion. We have thought only of today, having no proper regard for the future. We have cut away our forests and paid no attention to the necessity of taking steps for their ultimate restoration. It is but a truism that if the forests are swept away, the rainfall quickly flows into the streams and is wasted into the sea, whereas if the trees are properly preserved upon the watersheds, the rainfall and melting snows are stored in nature's reservoirs and are gradually fed into the streams for the benefit of both agriculture and navigation.
>
> We have not fairly begun to appreciate the full value of our streams and rivers. The waters which come down from the sides of these mountains may be converted into electrical power and carried hundreds of miles with but little loss to the initial energy and appropriated to lighting and heating cities, operating mines and driving the wheels of industry. We have thousands of miles of rivers which may be made navigable with little expense to the government compared with the benefits flowing from their use in carrying commerce.
>
> There is no better equalizer of rates than water competition. Water transportation is a perpetual and certain guaranty against monopoly on the part of common carriers.

First Orange Tree in California.

Senator Perkins called attention to the interesting fact that fifty years ago there was but one orange tree in all California. That was at Bidwell's Bar, a mining camp in Butte County, and was the wonder of all that saw it. During the present year, he said, California shipped 28,000 carloads of oranges, or 10,620,000 boxes, worth $30,800,000.

The strongest ally of irrigation is the forest, the Senator continued, and California contains about 22,000,000 acres. He continued as follows:

> Of the revenue derived from the sale of timber, rent of pasturage, etc., on the reservations, less than 10 per cent is used for the improvement and betterment of the respective forest reserves. This 10 per cent goes to the respective counties in which the reserves are located, being turned over to the public school and road fund. The government received from the reserves in California $160,642.88 during the last fiscal year. Therefore, 10 per cent of this amount, or, say $16,064.29, will be equitably distributed among the counties that have forest reserves within their boundaries.

President Briggs of the State Board of Trade, the next speaker, said that Leslie W. Shaw, while Secretary of the Treasury, had said that the returns from the farms in this country aggregated more than $6,500,000,000 annually and that any addition to this great source of national wealth must come through irrigation.

Mr. Briggs said in conclusion:

> The men who have come to this Congress at considerable sacrifice to their own interests are here to discuss questions that relate to irrigation, because they want to know what is most practical and best. You have reason to congratulate yourselves that much of the progress in irrigation in this country has come from former Congresses and also to expect that continued benefits will come from this and subsequent meetings under like auspices.

China's Representative Talks.

Owyang King said that in China, which has practiced agriculture and irrigation from time immemorial, the people were taught that the highest honor was due the citizen that tilled the soil.

At the second day's session of the congress the dominant strain of the papers read was the necessity of conserving the country's natural resources and utilities. There was a protest in them against the squandering of the coal, natural gas and oil supply; against the overstocking of ranges to the destruction of the forage plants and against the impoverishing of the soil and the wasteful use of water.

One of the important papers was that on drainage by George Eames Barstow, president of the National Drainage Association. He dwelt on the results that would be attained under the Flint bill providing for the drainage of swamp areas, which is gone into in detail in an article in another part of this publication, and during the course of his remarks called attention to the irreparable damage done land by the use of too much water. He said that no greater mistake in agricultural practice is made than the attempt to substitute irrigation for cultivation. Heavy flooding of lands has raised the water table, brought up alkali from below and practically ruined thousands of acres of very fertile land.

Kickers' Complaints Are Aired.

This day's session was enlivened by the "kickers," who forced a hearing upon the congress. Their main desire was to have adopted a resolution calling for an investigation by congress of the work of the Reclamation Service, and especially of the connection of Engineer J. B. Lippincott, formerly of the service, with the securing for Los Angeles of the rights to water from Owens Lake. It was charged that the Reclamation Service worked with promoters that wished to sell water rights to Los Angeles, and that a large area of good land would be deprived of irrigation. The charges were held in light esteem by the congress. Before adjournment the "kickers" organized an association with the following officers: L. M. Holt of Los Angeles, president; R. T. Perry, Los Angeles, secretary; I. T. Gleason, Riverside, treasurer; P. W. Forbes, vice president for California; C. W. Happy, vice president for Washington.

The new body is to be known as the "Settlers' Irrigation Protective Association," and the members will be those settlers under any project that have complaints to make.

The congress listened with the deepest attention to the speech of Chief Forester Pinchot, who said in part:

> We, the American people, have come into the possession of nearly 4,000,000 square miles of the richest portion of the earth. It is ours to use and conserve for ourselves and our descendants, or to destroy. The fundamental question which confronts us is, What shall we do with it?
>
> As a people, we have been in the habit of declaring certain of our resources to be inexhaustible. To no other resources more frequently than coal has this stupidly false adjective been applied. Yet our coal supplies are so far from being inexhaustible that if the increasing rate of consumption shown by the figures of the last 75 years continues to prevail, and there is every reason to believe that it will grow rather than lessen, our supplies of anthracite coal will last about 50 years and of bituminous coal but little over 100 years. From the point of view of national life, this means the exhaustion of one of the most important factors in our present civilization within the immediate future. The waste in use is not less appalling. But 5 per cent of the potential power residing in the coal actually mined is saved and used. For example, only about 5 per cent of the 150,000,000 tons annually burned on the railroads of the United States is actually used in traction; 95 per cent is lost. In the best incandescent electric light plants but one-fifth of 1 per cent of the potential value of the coal is converted into light.
>
> Many oil and gas fields, as in Pennsylvania, West Virginia and the Mississippi Valley, have already failed, yet vast amounts of gas continue to be poured into the air and great quantities of oil into the streams. Cases are known in which vast amounts of oil are systematically burned in order to be rid of it. The prodigal squandering of our mineral fuels proceeds unchecked in face of the fact that such resources as these, once used or wasted, can never be replaced. The waste of oil is among the most dangerous of all wastes now in progress in the United States. In 1896 Professor Shaler, than whom no one has spoken with greater authority on this subject, estimated that in the upland regions of the states south of Pennsylvania 3000 square miles of soil had been destroyed as the result of forest denudation and that the destruction was then proceeding at the rate of 100 square miles of fertile soil per year. No seeing man can travel through the United States without being struck by the enormous and unnecessary loss of fertility by easily preventable soil wash. The soil so lost, as in the case of many other wastes, becomes itself a source of damage and expense, and must be removed from the channels of our navigable streams at an enormous annual cost.
>
> The destruction of forest plants by overgrazing has resulted, in the opinion of men most capable of judging, in reducing the grazing of the public lands by half. The destruction of forest plants is accompanied by a loss of surface soil through erosion, by forest destruction, by corresponding deterioration in the water supply, and by a seri-

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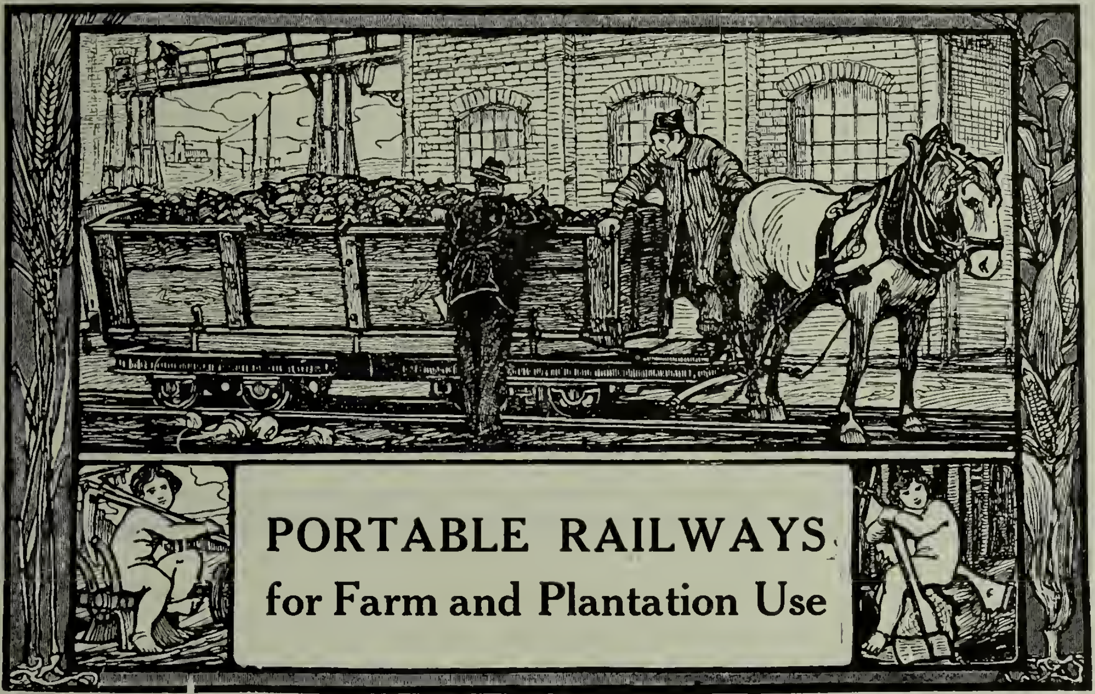

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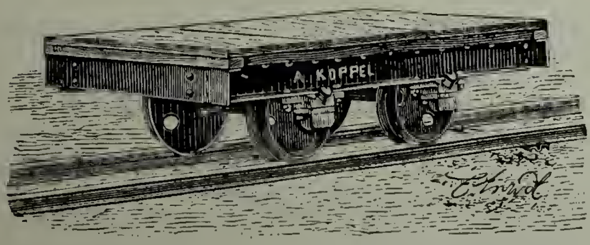

Fig. 109
Platform wagon with square steel underframe and wooden floor without buffers.
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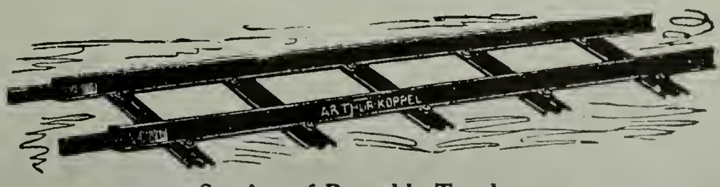

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> ous decrease in the quality and waste of animals grown on overgrazed lands.
>
> The lowest estimate reached by the forest service of the timber now standing in the United States is 1400 billion feet, board measure; the highest is 2000 billion. The present annual consumption is approximately 100 billion feet, while the annual growth is but a third of the consumption, or from 30 to 40 billion feet. If we accept the larger estimate of the standing timber, 2000 billion feet, and the larger estimate of the annual growth, 40 billion feet, and apply the present rate of consumption, the result shows a probable duration of our supplies of timber of not more than 33 years. It is evident that all the waste must, if possible, be prevented.

Newlands' Transportation Views.

One of the main features of Senator Newlands' address was his contention that the government should not only control interstate transportation, both by rail and by water, but should itself create the corporate agents providing the transportation.

Senator Newlands said that the Inland Waterways Commission had been in existence a few months only and that its work had thus far been one of investigation, for which reason it had not yet formulated its suggestions. The letter of instructions from the President was that the commission should study all questions relating to inland waterways with a view toward recommending practical legislation concerning them. He continued in part as follows:

> Every creek, every brook, contributes in some degree to the volume of the river or lake which should serve as a part of the great machinery of transportation, and a thorough and comprehensive plan of artificializing waterways should be adopted, with a view of securing stability of channel.
>
> It is impossible to indicate now what the form of legislation should be. Individually I should say that some plan in which the chiefs of the great scientific services of the country could be brought together in a national board of public works, with power to make comprehensive plans, and to work them out gradually, might be the most efficient way. I cannot imagine an organization more perfect than one which would include the chief of the engineer corps of the army, the director of the geological survey, the director of our coast and geodetic survey, our Panama canal service, our reclamation service, the chiefs of our forestry service and of the bureau of soils.

Questions Will Be Solved.

> Under national incorporation the questions relating to inland waterways, railway and ocean transportation will be solved. There will be great corporations, whose lines will extend from the Atlantic to the Pacific, and others whose lines will extend from the lakes to the gulf. Such corporations will, in transporting bulky products, utilize the inland waterways through steamboats and barges constructed for that purpose. They will own great steamship lines, which will carry our products to all the markets of the world. They will, subject to the approval of the interstate commission, be enabled to make such joint rates by land and sea as will make their ships profitable, notwithstanding the increased cost of American construction and administration. There will be no need of ship subsidy to advance our merchant marine. These corporations will be under full government control.
>
> We cannot take a broad view of the powers of the national government as relating to carriers by water and refuse to recognize those powers as relating to carriers by rail. Transportation is a national question. The common carriers engaged in interstate and foreign commerce must be national agents. The laws creating them must be the laws of the nation. The regulations which control them must be the regulations of the nation.

Ex-Governor Pardee made one of the strongest addresses of the congress in favoring the preservation of the forests. He spoke of California's great interest in the matter and said the State should adopt such legislation as would insure preservation of the natural timber. He referred to the methods practiced in Germany. The government did not intend to take the forests from the use of the people, he said, but to preserve them for that very purpose.

The message of Secretary of the Interior Garfield, who is the head of the Reclamation Service by virtue of his office, was important. In it he opposed the extension of time of payments for water rights, saying that the efforts to obtain the extension was being made by speculators. Referring to this subject, the Secretary said:

> The most critical period in the reclamation work is at hand. It is the maintenance and operation of the completed projects and payment by the water users. Already there are suggestions and requests that the first year's installments for cost and maintenance be postponed or be lessened. The success of this great work depends upon the strict enforcement of the provisions of the act regarding payments, and any postponement or reduction surely means great difficulty later on. The only way to insure the success of present projects and the development of other projects is to pay promptly for existing ones.

Albuquerque Wins Over Walla Walla.

M. O. Leighton said that the building of dikes and levees would not protect the lowlands. It was necessary to restrain the waters in mountain reservoirs. "Lock the water in the hills and keep the key to the door," he said.

Prof. Samuel Foster advocated extending the time allowed for payment for water rights, saying that poor people usually settled on the lands and that ten years might not be enough in some cases.

A feature of the fifth day was the address of the Syrian Behannerty. He speaks English fluently, having been educated in this country. He drew a lesson for America from his own country. He said the trust had been known in his land before this one was discovered. Where the despoilers of the forest had held sway there was desolation today. Where they had been successfully fought there were forests and gardens.

Besides the debate over the lumber tariff resolution, the last day of the Congress was distinguished by the election of officers and the choice of a place of gathering next year. In the latter fight Albuquerque won over Walla Walla by the vote of almost every delegation, it being considered that a session of the Congress was about due the Southwest.

ALKALI IS BUGBEAR OF WATERED LANDS, BUT CARE WILL RID FARMS OF IT

THAT the greatest civilization of the Ancients rose upon the deserts is said to be because the arid lands are really richer than those of the humid regions, and produce far better than the former when given water. Professor Hilgard, the soil expert, says that the wonderful fertility marking arid lands is an inherent quality. He goes into the matter as follows:

"Soils are formed from rocks by the physical and chemical agencies commonly comprehended in the term 'weathering,' which includes both their pulverization and chemical decomposition by atmospheric action. Both actions, but more especially the chemical one, continue in the soil itself; the last named in an accelerated measure, so as to give rise to the farmer's practice of 'fallowing'—that is, leaving the land exposed to the action of the air in a well-tilled but unplanted condition with a view to increasing the succeeding year's crop by the additional amount of plant food rendered available, during the fallow, from the soil itself.

"This weathering process is accompanied by the formation of new compounds out of the minerals originally composing rock. Some of these, such as zeolites and clay, are insoluble in water, and therefore, remain in the soil, forming a reserve of plant food that may be drawn upon gradually by plants; while another portion, containing especially the compounds of the alkalies—potash and soda—is easily soluble in water. Where the rainfall is abundant these soluble substances are currently carried into the country drainage, and through the rivers into the ocean. Among these are potash, lime, magnesia, sulphuric and a trifle of phosphoric acids. Where on the contrary the rainfall is insufficient to carry the soluble compounds formed in the weathering of the soil-mass into the country drainage, those compounds must of necessity remain and accumulate in the soil."

Commenting on the foregoing Smythe says: "All this is perfectly comprehensible, even to the lay mind. The valuable ingredients of the soil, which are soluble have been washed out of the land in humid regions, like our Eastern States, by the rains of centuries. On the other hand these elements have been accumulating in the arid soil of the West during the same centuries. They lie there now, like an inexhaustible bank account on which the plant life of the future may draw at will without danger of protest. The process which created this rich soil goes on repeating itself—recreating the soil season after season."

The details of the soil characteristics are embodied in the special articles on each project that follow in this publication. The land under the various systems has the advantage of being new and for that reason possesses its fullest strength, which, with the copious use of water may not be lessened for years. There is no place among them where the settler need think of fertilizing, at least not for a long time. Some of the areas, under large rivers, are fertilized naturally each year by the silt borne down from the mountains, as the Nile annually fecundates the area that it waters.

Ditches Better Than Rainfall.

No matter how copious the rainfall may be in any region, better farming results can always be obtained by irrigation, where a lighter fall makes it necessary. Rain never falls just in the right amount at the right time. It may be poorly distributed, falling in torrents when not needed at all, or holding off when crops should be watered. Where there is irrigation, the water can always be turned on just as needed, and to suit the soil, at the right time and in the proper quantity. Even poorer soils will therefore produce more with water under control, than richer ones where the natural distribution is relied upon.

Lands under the various government projects vary as much in the character of the soils as do the climates in which the various sections lie. Under every project the soil is good, for otherwise the government would not have started work. There are heavy and light lands, loams and clays. In some sections there is alkali, but methods of leeching and drainage—and the government is not overlooking this feature—will do away with this evil. The man who is not familiar with the working of lands should acquire the fullest information concerning this bane of cultivated soil

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before he begins farming with irrigation. The use of water may develop alkali in some lands where it had not previously been pronounced. In this connection it may reduce some of the unduly exalted ideas we have of our modern methods of close farming by noting the fact that the ancients were far more skilled in the working of watered lands and the preservation of them than are the growers of this age. They were perhaps more wasteful of water, but they would have deemed suicidal some of the methods in use today, whereby soluble salts are allowed to accumulate in such quantity as to ruin otherwise good land. A lesson is being learned by irrigators by bitter experience and strong effort is being made to undo the injury inflicted in many districts where irrigation has been practiced for a number of years.

Neither does it appear that in every one of the ancient centers of irrigation alkali was coped with successfully. Either because of lack of care or lack of sufficient water for drainage alkali gathered to such an extent as to have been responsible, it is thought, for the abandonment of some of the ancient districts where evidences of great irrigation systems exist today on dry wastes. But the ancients are supposed to have pursued mostly methods that kept their lands free from this obstacle to plant growth, especially in Egypt.

How Ancients Handled Alkali.

In olden times the Nile Valley was watered by the basin system and during about fifty days of every year the basins were given a thorough scouring that carried away the soluble salts. That much less drainage than this was necessary is shown by the fact that the sandy lands near the Nile were given a washing about once in seven or eight years only. They were protected by light levees, which gave way before the flood of the great river about as often as stated. This served to keep them clear of the fatal deposit. Thus, for thousands of years the ancients were not damaged by alkali. Now there are modern methods of culivation. The accumulation of alkali has not been given the strict attention that careful tillage demands. As a result many acres have been abandoned because of the concentration of the salts. The farmers of the years long dead probably learned as the men of today are learning that alkali must be fought by prevention, mainly. Having learned their lesson they suffered no more. There is a way of fighting this soil pest successfully.

Generally speaking alkali consists of the soluble salts that gather upon lands through evaporation and capillarity and damage or kill vegetation. These salts are sometimes carried in quantity by certain waters. Clayey soils are more susceptible to alkali than sandy ones. Professor King says the latter become seriously affected only nuder the most favorable conditions for the accumulations of the salts. Drainage is the remedy where once they have been allowed to accumulate. To cope with this evil there must be sufficient water in the arid regions that are irrigated, not only to water the crops but to carry off the dissolved salts. Water containing alkali can be treated by being run through cribs of uncrushed gypsum.

Ordinary Care will Prevent it.

With all the experience before them of those who have suffered loss by careless methods of cultivation or a lack of knowledge regarding alkali the settlers under the government projects should not be damaged by this foe to agriculture. Some of the lands contain it, some do not. Use of water is likely to develop it anywhere. It is not an obstacle to frighten settlers, though, only a possible enemy that will probably be encountered, as it has in almost every one of the highly cultivated regions. This little dissertation on it is given not to discourage in the least but to warn against thorn in the rose of irrigation prosperity. The settlers in every one of these rich regions that are being opened should early co-operate to prevent the invasion of this danger. It is an enemy that will not enter unless the watchers sleep. It is possible that the "Alkali Club" will be one of the early social and economic institutions of these budding Paradises.

Alkali is treated of fully and in an instructive manner by Lucius M. Wilcox, in his "Irrigation farming." The soils of the Eastern States are not troubled with this ingredient, and are in fact often too deficient in it, for a certain amount of alkaline salts is necessary for the best production. To the average Western farmer, alkali is a great bugbear, he says. The most injurious of the three principal alkaline salts is the carbonate of soda. Its property of combining with vegetable mold, otherwise known as humus, and forming with it, when dry, a black compound, has given what is known as the black alkali lands.

Worse in the Clay Soils.

Alkali is a natural element of the earth. The pulverized rock sediment from the mountains brings it down upon the plains. The same alkali salts are found everywhere in the world, but in countries having abundant rainfall they wash through the soil into natural drainage, where in regions where there is a smaller precipitation of moisture, they are carried down only a little way into the soil, from which they rise to the surface by evaporation and accumulate there. The alkali is all through the soil but is usually worse within a few inches of the surface. It rises with each wetting of the ground.

Alkali is worse in clay than in sandy soils, because in the former it rises to the surface from a greater depth. In the arid country the rains often wet the soil only a few inches deep and the alkali forms at the bottom of the moisture and makes what is called hardpan, for that is only a compact mass, caked by the alkaline.

There is rarely alkali in sandy soil, and where there is, it does no special damage.

At the Hacienda de los Hormos in Coahuila, a vineyard planted in stiff adobe soil, white as paper from rising alkali, is marvelously vigorous. At Viesca, in Coahuila, the clay soil of the public square is white with alkali but from it are growing magnificent trees and rose bushes. Wilcox judges from this that alkali is often misunderstood and deemed more pernicious than it really is toward vines, shrubbery and trees. Tender garden and field crops are seriously damaged by even white alkali, though.

Methods of Treatment.

The methods of the improvement of soils surcharged with neutral alkaline salts, the texture of which is very compact and adhesive, are given by this author as thorough tillage, leaching out of the salts by irrigations combined with either natural or artificial drainage, and frequent irrigation of the soil, assuring the intermixture of the surface deposit of alkali with the lower stratum of soil, thus diluting it and partly neutralizing its injurious presence. Cultivation checks evaporation and currently lessens the deposit of alkali on the surface. As a rule stable manure and other fertilizers are not only useless, but usually harmful applications. Alkalies are rich in plant food, so the addition of more can do no good.

"In many cases the over-irrigation of bench or slope lands has caused first the lower slopes and then the bottom lands to be overrun with alkali salts," Wilcox says, "although before irrigation these lands were exempt from them.

"The most effective means of getting rid of the white alkali is by washing it out of the land. This can be accomplished by digging open ditches at a lower level than the surface of the land to be treated, and carrying them to the nearest natural outlet. Then by running water over the land into the drains without allowing it to stand long enough to soak into the ground and carry the dissolved alkali with it, most of the alkali that has accumulated at the surface will be removed. By repeating this process a few times, land can be practically freed from alkali, unless it is exceptionally bad. Another plan, but an expensive one, is to underlie the land with vitrified iron pipe. It will last a lifetime and will take away the alkali."

Lime the Cheapest Antidote.

There are chemical antidotes for alkali, when it is not too heavy. Lime is about the cheapest. Neutral calcareous marl will do the work in some cases. When the alkali consists of carbonates and borates, gypsum, or land plaster, is the best antidote. The materials used should be sown broadcast over the surface and harrowed in prior to irrigating. From 400 to 500 pounds of gypsum to the acre should be used. Gypsum is the only cure for the fatal black alkali.

Applying Water to Lands.

The flooding system is stated by Wilcox to be the cheapest of applying water to lands. It is almost universally used for grass meadows and grain crops. On soils which bake and crack easily, flooding is injurious as a usual thing. For gardens and orchards the furrow system is stated to be the best. A new furrow in orchards or vineyards should be plowed every time irrigation is to occur. Water should not be allowed to rush down the furrow rapidly, to get the best effect. The basin system of creating a depression around a tree and filling it with water is disapproved. Under what is called the contour system, the land is divided into compartments or checks, each surrounded by embankments of earth. The principal embankments follow contour lines, the vertical distance from one of the latter to the next being uniform. The contour interval usually selected is from six to nine inches, rarely so great as one foot. It depends upon the surface of the ground and should be less than six inches if the ground is sufficiently flat to permit that without making the individual checks too small. The checks are filled successively from the ditch.

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Alfalfa and Sugar Beets Staple Crops That Produce Wealth Wherever Grown.

IT is fortunate that two great staple products, certain of prolific growth wherever water is developed, have become established as agricultural factors on this continent just as irrigation is reaching to such stupendous importance. Sugar beets and alfalfa have become universal products that have a natural market, scarcely without regard to the remoteness of any region where they may be grown, though it is a certainty that a railroad will nose into any section where they are produced abundantly. These have become universal crops in this country, and any man with a piece of irrigated land can make money without growing anything else.

The consumption of sugar is growing at an enormous rate in this country. We still import $100,000,000 worth a year. The great production has lowered the price to a figure, that makes it no longer a semi-luxury, as it was a few years ago, and it has become a freely used staple. The farmer does not have to ship his beets to a distant market, as he may have to when selling other produce. He only hauls them to the factory and gets his money. There the many tons of vegetables are reduced to the crystal product and shipped away like the gold extracted from a mountain of quartz. Freight rates cannot take away the profits. Even the residue, the pulp, is not wasted. There is nothing better to fatten stock with. The farmers are willing to buy it back at a reasonable figure, but the mills usually feed cattle or sheep themselves.

Sure Sale For Alfalfa.

Alfalfa is usually salable in any irrigated district at good profit to those engaged in stock raising, or to the towns and cities for the feeding of horses and cows. It can be shipped for a long way at a profit. Too much of it can never be raised. The grower, if he should find at any time that there is not a price for it that he deems sufficient, can turn it into beef, pork or mutton, which will always bring a good price. His alfalfa will then be shipped in reduced bulk, just like the product of the sugar beet.

There are very few sections where sugar beets cannot be produced in quantity and of good quality; there are none where alfalfa will not grow.

As alfalfa, or lucerne, as it is also known, is the principal hay crop in most irrigated regions and is looked to as the first great wealth producer of those that may settle under the government projects, something concerning it will be of interest to the readers of this publication. This plant has come to us from the dusty past of the ancients. It will be a surprise to many to learn that it is not a grass, but is on the leguminous, or bean list, belonging properly to the pea vine family. It is very tenacious when once planted and does not need renewing by the planter during his lifetime. Its real age limit has never been determined, but plants have been known to thrive for 200 years. It is the most wonderful forage plant the world has known. In many lands it is looked upon as the staple hay crop and thousands of farmers in the United States have acquired competencies through its production.

One of the remarkable and advantageous features of this plant is that it does not impoverish the soil, but strengthens it. Through its root nodules it constantly replenishes the land with nitrogenous fertilizing elements drawn from the atmosphere.

The name alfalfa is from the Spanish. The French, Swiss, German and Canadian people call it lucerne. Its history is not known further than the chronicles of Greece. The historians of that country say it was brought from Media, in Asia, to Greece, in Europe, during the reign of Darius, about 500 years before Christ. It was cultivated by the Roman people and worked its way to the south of France, where it grew into popularity. On the pampas of the Argentine it grows profusely.

Introduced by the Spaniards.

The early Spanish conquerors introduced alfalfa into America. They brought it to Mexico and the padres carried it to Southern California when they established the Missions there. Its value was learned in the western part of the United States in later years. In 1862, Major Jacob Downing took some of the seed from Mexico and planted it in a house yard in Denver. From this small beginning it spread all over the State of Colorado and the Rocky Mountain region in general, finding its way also, as far East as the Mississippi.

Improving the plant became a care of the government and in this effort the Turkestan alfalfa was introduced by the Department of Agriculture. This department believes that this plant is an improvement over the original brought from Mexico, but Wilcox expresses doubt on the subject. The plants of the Turkestan variety may be more leafy, he says, but he does not believe that they grow any faster or have a stronger and more vigorous root system. The claim is made for the Turkestan alfalfa, however, that the stems are more slender and less woody and that the plant makes a more nutritious and finer quality hay than the common alfalfa.

Another advantageous feature about alfalfa is that most any soil that has substratum porous enough to permit of proper drainage and does not gather surface water is suitable for its production. With common sense methods and care in its raising, success is almost certain. It grows better on bench than on bottom land and better on sandy loam than on clay. A longer time is needed by the plants, though, to establish themselves in sandy soil.

How to Sow Alfalfa.

It is necessary in preparing land for the seeding of alfalfa to make it so level that the water will cover it all without the necessity of the irrigator entering the tract. The land should be flooded immediately before sowing seed, and the sowing should be done as soon afterward as the land will permit. The irrigation before the planting insures the germinating of the seed. A dense and uniform stand is necessary to the production of good hay, as the plants become coarse and woody if not growing thickly. From twelve to thirty pounds of seed are used to the acre, according to the method of sowing and whether a hay or a seed crop is desired. In the latter case the stand should be thinner.

The critical time with alfalfa is the first six weeks of its growth. Flooding during this period is quite certain to give the plants a backset from which they seldom fully recover before the second, and sometimes not before the third year, and it is not often in the arid states that rain falls with sufficient frequency to dispense with the necessity of irrigating the plants while small. By soaking the earth from thirty-six to forty-eight hours before seeding, however, the plants will make vigorous growth until they are ten to twelve inches high, after which they may be irrigated with safety.

Eradication of Weeds.

There will be a growth of weeds with the alfalfa when it comes up and when they seem to be growing faster than the hay crop, the whole growth should be mowed down and left on the ground to protect the roots of the alfalfa plants. The forage plant should get the start of the weeds, then, and crowd them out.

In humid climates some of the alfalfa fields are attacked with root rot. This causes the plant to die in circles in June. Cool weather checks the evil, but in the following June a ring of alfalfa dies on the margin of the circle. This is due to a fungus trouble. No sure cure or preventive has been found. Salt, kerosene and other antidotes arrest it in part. Leaf spot also attacks this plant in nearly every humid section. Covering with straw and burning stops this.

In the West, what is known as dodder attacks the alfalfa. It is a parasitic plant with yellow or reddish twining stems that wind themselves around the alfalfa stalks near the root, stealing their nourishment. It will kill alfalfa if abundant. Cutting the alfalfa before the dodder blossoms, will kill the latter, or it can be eradicated by burning, or by plowing the crop under and planting the land for a year or two to plants with stems so large that the dodder cannot feed upon them.

The alfalfa worm is also a pest. It acts much like the army worm, destroying leaf, stem and branch. The midge works into the seed balls of of the plant, doing much damage, and a clover blossom worm also injures alfalfa to a certain extent. Flooding the field will usually eradicate the worms.

Feeding Young Ducks.

I have raised hundreds of ducks and found that the best way to feed them is to feed them corn bread, with a little chopped onion tops, until they are several days old; then put lettuce or mustard in with the corn bread. Feed them this until they are old enough to run about well; then mix bran with the corn bread, chopped lettuce or mustard, and when they are about half grown feed them bran and the greens without the corn bread. I have found that as they grow older they will pick out the greens in preference to any other kind of food. Never give them raw meal and don't let them have too much water when they are quite young. Give them plenty to drink, but not enough to paddle in until they are several days old.—Indiana Farmer.

Irrigated Fruit Lands
in the
Bitter Root Valley of Montana

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THE BITTER ROOT DISTRICT IRRIGATION CO. lands are practically the last of the distinctly high-class fruit lands purchasable at a price which will permit a man in moderate circumstances to secure a fruit farm, as the most valuable lands for fruit culture are fast disappearing from the market. Fruit lands are readily selling at $300 and upward per acre for undeveloped irrigated lands, and as Eastern orchards are rapidly deteriorating, owing principally to intemperate seasons, $500 to $700 and upwards per acre are prices at which well developed irrigated orchards find ready sale today. Crop records of the Bitter Root Valley show as high a yield, net, per acre, as any land in the U. S.

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We GUARANTEE to refund within 90 days of purchase the entire amount paid for lands which, after investigation, do not entirely please the buyer.

READ WHAT THE U. S. GOVERNMENT says about the Bitter Root Valley. Report from the Department of Agriculture. Bulletin No. 172.

"Throughout the valley diversified farming is practiced. All kinds of cereals do well. Red clover and timothy seem to be preferred in places to alfalfa. The soil is peculiarly well adapted to vegetables, and both soil and climate are admirably suited to fruit raising. The apple, plum, cherry, and in fact all the hardier varieties of deciduous fruit trees, appear to have found in the Bitter Root Valley ideal conditions for their growth. Sheltered from the west winds by the Bitter Root Mountains and from the east winds by the main range of the Rockies, the valley possesses a much more moderate climate than many fruit producing regions which lie far to the south of Montana."

Land Values

IT is difficult for those not informed to understand why lands in some of the Pacific slope valleys are so much more valuable than, for example, Illinois farm lands. The reason is that the valley lands grow a much higher priced product than corn, wheat, or oats. The yield from an acre of high grade Western fruit land will bring in money from ten to twenty times more than an acre of grain. This is the secret of the higher values. Apples grown in the Bitter Root Valley are never sold in barrels, but are packed in boxes and sold as fancy fruit. The area of lands capable of producing fruit of the quality grown in the Bitter Root Valley is limited to a few valleys in the Northwest. Hence the high price that such land commands.

THE MONTANA AGRICULTURAL STATION
BOZEMAN, MONTANA

DEPARTMENT OF HORTICULTURE
R. W. FISHER, HORTICULTURIST

BOZEMAN, MONT. Sept. 17, 1907.

BITTER ROOT DISTRICT IRRIGATION COMPANY,
100 Washington St., Chicago.

GENTLEMEN:—

I have just this morning returned from the Bitter Root Valley. The fruit this fall is an eye opener, even to people who are acquainted with conditions in the valley. I have seen some of the best apples the past week that I have ever seen anywhere, not excepting the Hood River.

In regard to the ten-acre tracts of land which are sold for $1,000, I have figured out what I think is a liberal estimate for the expenditures during the first year on this land. Expenditures are as follows:

First payment $250.00, house $250.00, taxes $5.00, interest on first deferred payment $45.00, trees $125.00, water maintenance $12.50, fence $50.00, horse $100.00, cow $30.00, seeds $40.00, plow and cultivator $35.00, strawberry plants $35.00, single wagon $75.00, making a total of $1,052.50, which would be necessary to spend to get ten acres on a paying basis.

The income following for the first year could be made by one who has some knowledge of growing vegetables or by one who is willing and capable of taking advice or profiting by experience of others:

Two acres of potatoes $200.00, two acres cabbages $400.00, one acre miscellaneous vegetables $200.00, one acre onions $150.00, making a total income for the first year of $950.00. In addition to this, in the fall of 1909 he could get a profit from one acre of strawberries which would be in the neighborhood of $300.00.

Starting with $1,000.00 an energetic man will not make a failure on ten acres of land in the Bitter Root Valley. Even if he had less than this amount a person could make a living and get a place started by doing work for neighbors or in the lumber camps. I could point out a number of farmers in the Bitter Root Valley who have gone in there during the past four or five years without any capital whatever and have made not only a living but have been putting money in the bank Of course, a great deal depends upon the man, but I believe any one will be perfectly safe in starting in with a ten acre tract, even though his capital is limited to $1,000.00.

Very truly yours,
(Signed) R W FISHER.

Bitter Root District Irrigation Company

Chicago Title and Trust Building **Room 505, 100 Washington Street, Chicago, Ill.**

Schnadig Adv System—Chicago

Irrigation of High Lands in the Salinas Valley

REMARKABLE SCIENTIFIC PUMPING PLANT WITH THE MOST CAPABLE MODERN EQUIPMENT THAT LIFTS WATER FROM VARYING HEADS IS INSTALLED ON RIVER THERE

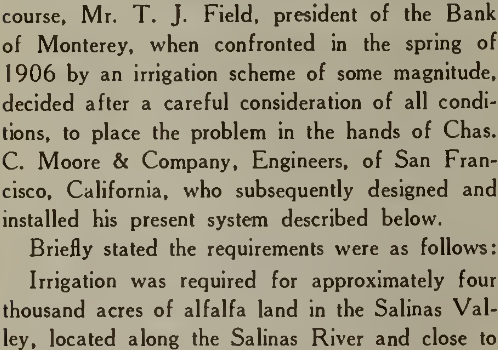
NOTWITHSTANDING the necessarily greater initial cost of a scientifically designed plant embodying the higher types of machinery, it is nevertheless conservative engineering and sound business judgment to invest in a superior grade of apparatus when a proposed improvement of a permanent nature is under consideration. The careful investigation and study of the conditions to be fulfilled, the applied results of a long practical experience, the studious application of the finer as well as the more fundamental principles involved in the special problem under consideration, a careful consideration of the items of reliability, flexibility and economy of operation, are factors which, in the end, determine the matter of profits.

These conditions apply with tenfold force to the complications of irrigation problems with their numerous methods of solution. Few, indeed, not intimately and continuously connected with work of this character can form an adequate conception of the possibilities in the way of ultimate economy from a commercial viewpoint, which may be realized from a thorough analysis of these elements by a competent concern, and the comparatively large losses which inevitably follow their disregard.

Strong in the belief of the wisdom of this course, Mr. T. J. Field, president of the Bank of Monterey, when confronted in the spring of 1906 by an irrigation scheme of some magnitude, decided after a careful consideration of all conditions, to place the problem in the hands of Chas. C. Moore & Company, Engineers, of San Francisco, California, who subsequently designed and installed his present system described below.

Briefly stated the requirements were as follows:

Irrigation was required for approximately four thousand acres of alfalfa land in the Salinas Valley, located along the Salinas River and close to the town of Soledad, Monterey County. This water was required principally during the months of May, June, July, and August, and it afterwards developed that the best results were obtained by one wetting every six weeks to a depth of about four inches. The muddy and sometimes turbulent Salinas River supplied the necessary water, of which it was estimated fourteen thousand gallons per minute would be required. This river, at the point under consideration, flows through its self-formed depression, the banks of which are steeply cut and rise to a height of about thirty-eight feet above water level.



"The main engine is of the . . . tandem compound condensing . . . type."

From the top of the bank a gradual incline sweeps gently to the northward and it is this almost level incline which requires irrigation. Obviously, then, the process must be divided into two parts: (1) lifting the water by some means from the river some thirty-eight feet vertically to the crest of the bank; and (2) supplying the land with the water thus lifted by means of a system of canals and by gravity.

It was found, however, that nearly three-quarters of the land could be reached by tapping the discharge line from the river at a point in the neighborhood of twenty-two feet above the water level and constructing a more or less circuitous canal along the side of the river bank to a point where the crest was lowered, thus saving the additional and unnecessary work of pumping the entire quantity of water to the highest point. In this manner three discharge levels were determined (1) twenty-two feet above the river level, at which point five-eighths of the water was required; (2) thirty-six feet above the river level, at which point about one-quarter of the discharge was needed; and, finally, (3) thirty-eight feet above the river or the crest of the bank, where the remaining one-eighth of the supply would be utilized.

"The suction pipe . . . . finally dips down into the river."

This condition, therefore, immediately necessitated some sort of a pumping equipment adapted to pump against variable heads, and so designed and proportioned as to be capable of supplying a sufficient quantity of water at each head.

To meet all of these requirements, a pumping plant was finally developed of the steam driven type, consisting of a water tube boiler, a horizontal tandem compound condensing engine, direct coupled to a high duty horizontal centrifugal pump, together with a surface condenser and all necessary auxiliaries.

The attached cut shows in outline the arrangement as finally determined upon.

To commence at the beginning, steam is supplied by one Babcock & Wilcox patent safety water tube boiler of the vertical header type, under a gauge pressure of 150 pounds per square inch. The boiler contains 861 square feet of effective water heating surface, and is of sufficient capacity, with the economical types of apparatus employed, to easily take care of any load to which the plant might be subjected. The boiler is the standard equipment as furnished by the Babcock & Wilcox Company in every particular, with the exception of the furnace arrangement, which latter is especially designed for burning California crude oil. In this furnace the burner is located at the rear, near the bridge wall, and projecting its flame forward towards the firing doors, thus secures a gradually expanding furnace volume for the gases as combustion proceeds; at the same time effecting an even distribution of the flame over the entire heating surface of the boiler. These conditions result in an entire absence of a "blow-pipe" action so frequently found in oil burning furnaces. The possibility of burning out the boiler tubes, therefore, is minimized, while the highest obtainable boiler efficiency necessarily follows. The furnace is of the exceptional length of ten feet from bridge wall to boiler front. One burner of the P. & M. type is used, but a spare burner was provided with the plant equipment.

The waste gases from the boilers are conducted to the atmosphere through a steel breeching and smokestack, the latter being twenty-four inches in diameter by fifty feet high. Both stack and breeching are constructed of number ten steel, and are riveted together with three-eighths inch rivets, three inch pitch. A full set of guy ropes and stack-fittings are provided with the stack and ample cleaning out doors are located so as to permit of easy cleaning.

Only one main boiler was provided, for the reason that the conditions of operation would allow of the plant being shut down at frequent intervals for sufficient time to easily clean the boiler, but, inasmuch as oil was used for fuel and steam used to atomize the oil, some means must needs be provided for furnishing steam pressure to operate the burners after the boiler had been shut down for cleaning, or after the plant had been inoperative for any considerable period. To provide for this contingency, a five-horsepower horizontal fire box boiler was installed, arranged to be fired by wood or any other refuse. In this

"Steam is supplied by one Babcock and Wilcox . . . . boiler."

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manner, sufficient steam pressure could be made available to operate the burners or to operate the feed pumps which supply the water for the turbine tube cleaners when the main boiler was under cleaning.

A four-inch steam main conducts the steam to a Hoppes vertical steam separator which is bolted directly upon the throttle of the main engine. It is the office of the separator to separate any moisture which may be entrained with the steam due to condensation in the pipe lines, etc., and being located adjacent to the engine cylinders where the steam is used, a high initial steam pressure is maintained in the high pressure cylinder (due to the comparatively large reservoir capacity of the separator) and the pulsations resulting from the intermittent opening and closing of the steam valves are absorbed, which reduces the pipe vibration to a minimum.

The main engine is of the horizontal tandem compound condensing piston valve automatic self-oiling type, as manufactured by the Harrisburg Foundry and Machine Works, of Harrisburg, Pa. The high pressure cylinder is nine inches in diameter, the low pressure cylinder eighteen inches in diameter, the stroke thirteen inches.

Under normal conditions, namely, when the plant is operating against the lower head of twenty-two feet, the engine is supplied with steam at one hundred and thirty-five pounds initial steam pressure and operates at two hundred and seventy-four revolutions per minute, under which conditions there is developed one hundred and fifteen indicated horsepower at about one-quarter cut-off.

A notable feature in connection with the design of this engine is the fact that it is of the enclosed self-oiling type, the lubricant being supplied to the various bearings and pins by the centrifugal force of the crank pin working in an enclosed base partly filled with oil. In this manner the bearings are at all times working in a bath of oil which is far superior to the sight drop lubrication used on some of the cheaper grades of high speed engines. Being of the side crank construction, the machine presents a pleasing appearance, while a simplicity of construction and flexibility of all parts is maintained throughout. Unlike most engines of this type, the governor, which is located in the fly wheel, is centrally balanced under all conditions of load and speed. This is accomplished by means of two governor arms arranged in such a manner that their centers of gravity always move in harmony with the center of rotation. This results in a degree of perfection of regulation not attainable with other types of governors and in a large measure accounts for the smooth running qualities of these machines.

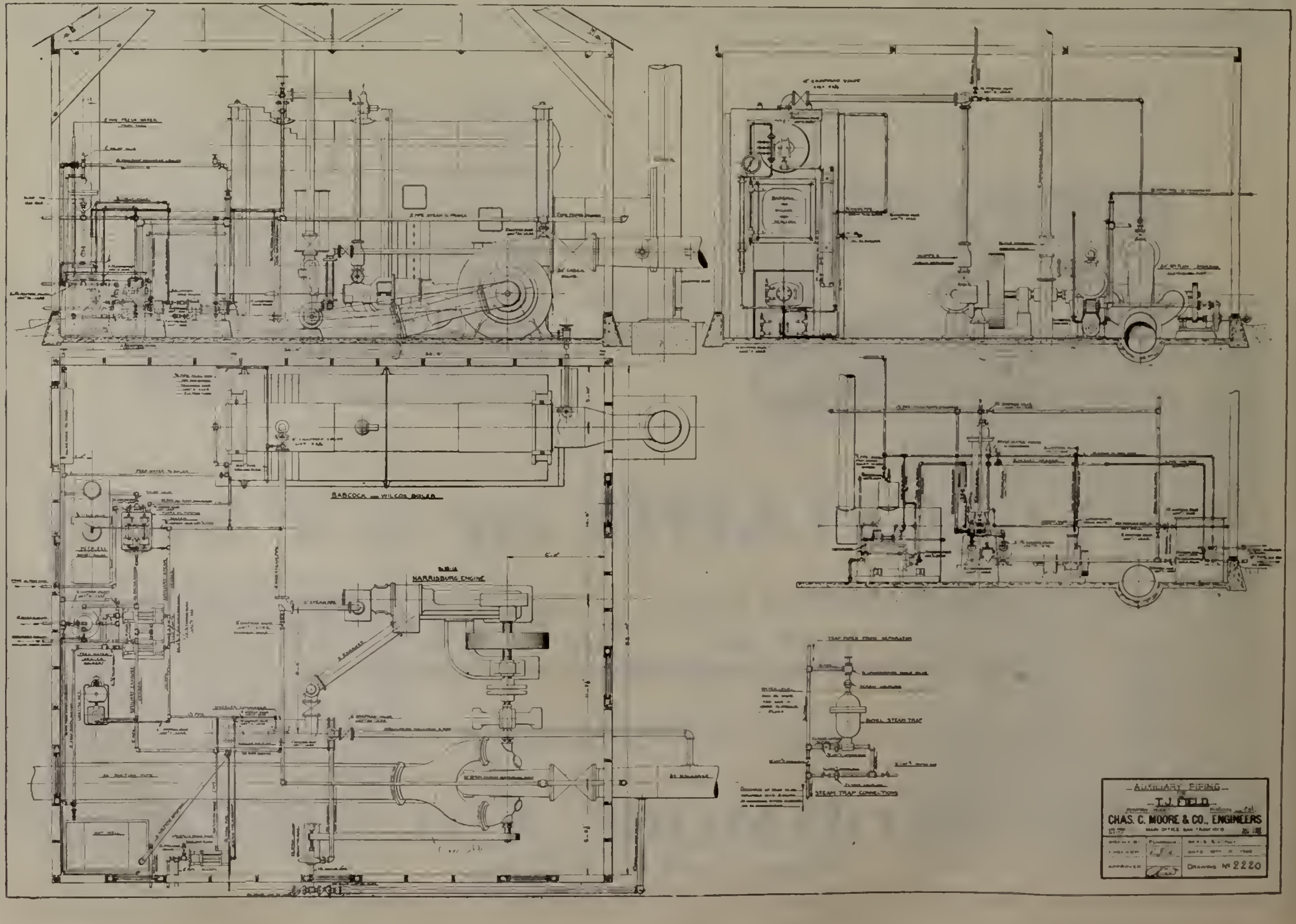
In order to insure satisfactory operation at the higher heads, which come upon the plant at times, it was necessary to provide some means of changing the engine's speed when required. For example, at the twenty-two foot head, two hundred and seventy-four revolutions were required, while at the thirty-six foot and at the thirty-eight foot heads respectively, the speed must be increased, for the conditions hereinafter described, to two hundred and eighty-two and two hundred and eighty-eight revolutions per minute. This was accomplished by a carefully graded and marked system of governor weights which when substituted in the governor arms permit of obtaining almost any speed between the limits of two hundred and sixty and three hundred revolutions per minute.

The engine is provided with a flanged flexible leather link coupling on its shaft extension and is arranged to couple directly to a twenty inch centrifugal pump. This construction was determined upon only after very careful investigation, both on the part of the owner of the plant and the constructing engineers. The old belted Corliss engine arrangement was the principal competitor of the present system, but it was finally decided that under the conditions which presented themselves and principally on account of the superior working economy, reliability and flexibility of the direct connected arrangement that the latter scheme would be selected. A substantial bearing was placed between the coupling and the centrifugal pump.

The pump itself is of the horizontal double suction centrifugal type, having one twenty inch discharge opening and two fifteen inch suction openings. A single suction type of pump was absolutely discarded, due to the variable head which would be encountered. By means of the two suction openings selected the pressure is divided equally between both sides of the impeller and all end thrust on the impeller and the shafting is thereby eliminated. The conditions of capacity for which the pump was designed are as follows:

Total Head.	G. P. M.	R. P. M.
22 feet	14,000	274
36 feet	8,000	282
38 feet	7,000	288

The impeller vanes were carefully proportioned and special attention given to their proper curva-



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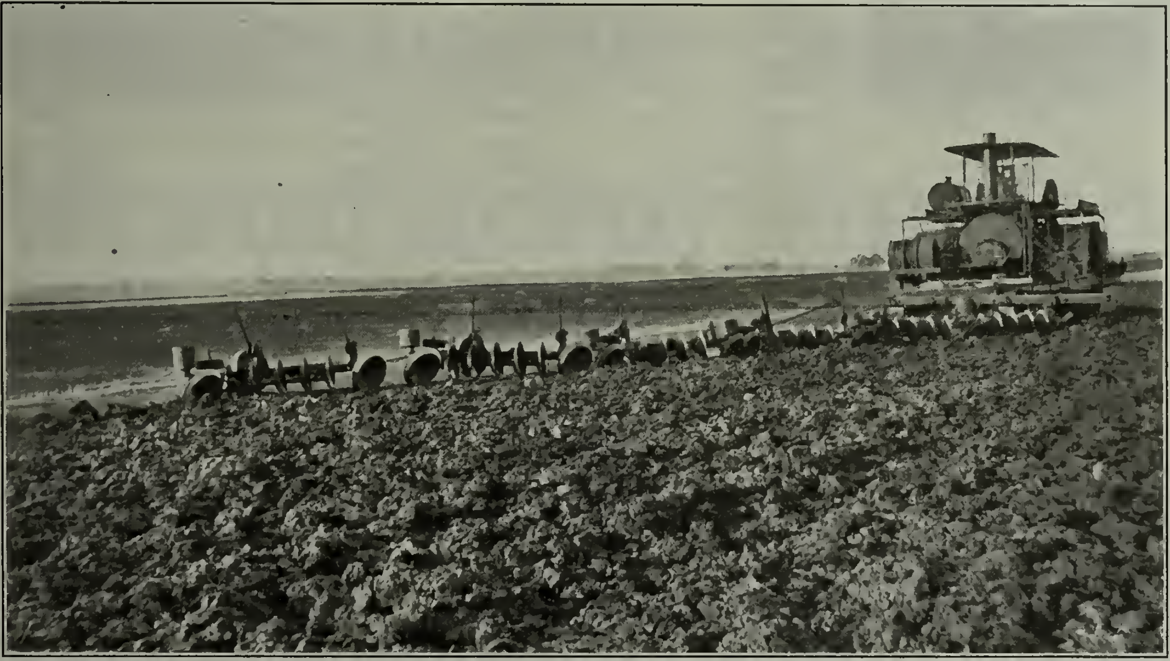

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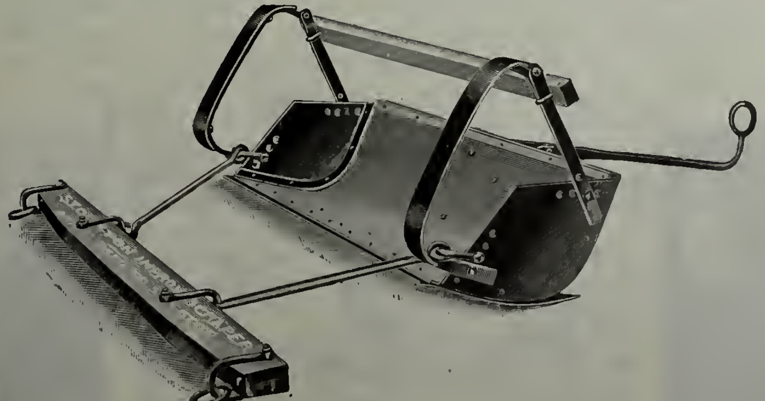

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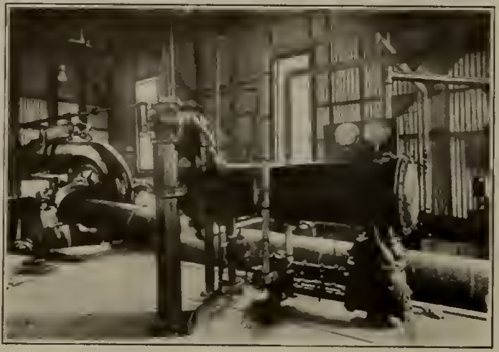
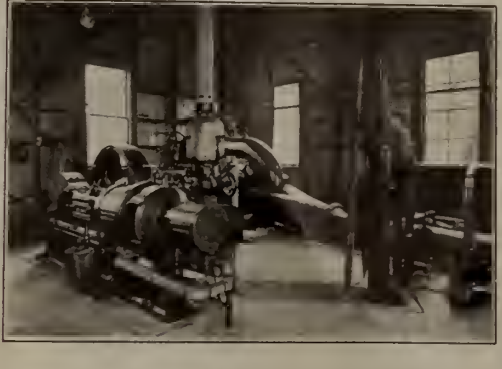
ture as well as to the areas of the water passages and the resultant water velocities in order to obtain the capacities listed above with a maximum degree of efficiency. The general design of the casing permits of all internal parts being removed without dismantling the pump or disconnecting it from the engine. Immediately upon the discharge of the pump is bolted a twenty inch horizontal check valve, which is provided with a worm and wheel adjustment, and is used in priming and starting the equipment. The primer is of the steam ejector type and is located at the top of the pump casing.


"A cylindrical surface condenser of the Wheeler Admiralty Type."

The exhaust steam from the low pressure cylinder of the engine is conducted through an eight inch exhaust line to a cylindrical surface condenser of the Wheeler Admiralty type, which is mounted above a direct acting horizontal air pump. The condenser contains three hundred and fifty square feet of effective cooling surface, consisting of seamless drawn brass tubes, three-quarters of an inch in diameter, number twenty gauge. The connection between the tubes and the composition tube heads is made by patent screw glands, which provide for the expansion and contraction of the tubes, independently of the shell and allow of withdrawing the tubes from either end of the condenser.

The air pump above mentioned has one steam cylinder, six inches in diameter, one pump cylinder, eight inches in diameter and a common stroke of ten inches. The pump is brass fitted throughout; the valves specially designed to handle the hot water of condensation.

The cooling or circulating water is compelled to pass through the condenser tubes, steam being admitted to the condenser shell. This water is furnished by a 2½ in. independent belt-driven centrifugal circulating pump, which takes its power from an extension of the shaft from the main pump. Considerable discussion resulted with reference to the proper water to use for cooling purposes and a well was finally drilled to supply the cooling water as well as for other purposes in case the water from the river was found to be too muddy for use. The suction of the centrifugal pump was arranged for connection with the discharge piping from the main pump and also with the well. After passing through the condenser, the cooling water is discharged into the main discharge line. Subsequent experience proved that it was never necessary to use the water from the well, as the velocity of the water passing through the condenser was so great that no impurities of any character were deposited in the condenser tubes, which was the principal cause of the objection before this method had been tried.


"A tandem compound condensing engine, ... direct connected to a high duty horizontal centrifugal pump."

Originally, it was contemplated to design the plant for non-condensing conditions, but after the saving had been carefully estimated, due to the addition of condensing apparatus, it was found that this auxiliary represented a very satisfactory investment, and it was therefore included in the equipment. It then became necessary only to determine upon the most suitable form and type of condensing equipment to be employed, and after the elimination of the jet condenser and other cheaper makeshifts, it was decided that the type finally selected would represent the best and most profitable investment from every standpoint.

The condensed steam and air flowing by gravity from the condenser to the air pump above described is pumped through a three-inch air pump discharge line to a combined hotwell and purifier. This hotwell is rectangular in form, being five feet long, three feet wide and four feet deep. It is constructed of number ten steel plate. The interior of the tank contains four partition plates, made of three-sixteenths inch steel, two of them extending from the top to within three inches of the bottom and the other two extending from the bottom to within ten inches of the top. In this manner the hotwell is divided into five vertical compartments, the inner three of which are filled with filtering material. The discharge from the air pump enters the first compartment, passes through each compartment in series and is taken up by the suction from the feed pumps from the last compartment, having been purified from its entrained cylinder oil during its passage through the hotwell. The latter is provided with a cock and ball float connected with the fresh water supply, which furnishes automatically the necessary "make-up" feed water, thus maintaining a constant level of water in the hotwell. The "make-up" water referred to represents only a very small quantity and is equivalent to the amount of water and steam lost in the system by leakage, etc.

Feed water is furnished to the boiler by means of two four and one-half by two and three-quarters by four Snow duplex piston pattern feed pumps, brass fitted throughout and designed for a safe working pressure of one hundred and sixty pounds per square inch. The steam and water piping was so arranged that one pump could be operated at a time, the other being held in reserve, and each pump was of sufficient capacity to furnish feed water for the entire plant when operating at its rated capacity. The feed pump suction is connected with the hotwell above described.

In addition to the two feed pumps, there is another Snow duplex pump of the same size and type, which is used for supplying drinking water from the well to the house and is also provided with hose and coupling for fire service.

The discharge from the feed pumps passes through a Goubert vertical feed water heater on its way to the boilers. This heater is of the closed type, having a cast iron shell and containing twenty-seven square feet of effective heating surface, consisting of eighteen seamless drawn brass tubes, one and one-quarter inches external diameter by seventy inches long. The tubes are expanded at each end into tube heads, provision being made for expansion and contraction by means of the Goubert patent flexible expansion joint. The heater is designed for a safe working pressure of one hundred and seventy-five pounds per square inch.

Feed pumps, heater, oil system, and lighting set, showing pipe connections.

Sufficient steam is available for heating the feed water to about boiling point and is obtained from the air pump, feed pumps and water pump. The exhaust steam from all of these auxiliaries enters a common auxiliary exhaust header, whence it passes into the shell of the heater, the feed water being on the inside of the tubes. Due to coming in contact with the comparatively cold surface of the heater tubes nearly all of the exhaust steam is condensed and flows by gravity to the bottom of the heater, where it is drained to the hotwell and taken up by the suction of the feed pumps in connection with the discharge from the air pump and the "make up" feed water. In this way nearly a perfect cycle of steam and water is effected throughout the entire system.

Briefly described, this operation is as follows: Steam is generated in the boiler, passes through the main steam piping and the separator to the engine, where it performs its prescribed work, exhausting finally to the surface condenser where it is condensed and taken up by the air pump and delivered to the hotwell. Here it is pumped by the feed pumps through the feed water heater and back again into the boiler which was our starting point.

The live steam which goes to operate the auxiliaries, after accomplishing this purpose, exhausts into a common header which leads to the heater. Here it heats the feed water, condenses, and passes by gravity to the hotwell, where it mixes with the air pump discharge. The condensation in the steam piping separator, etc., flows by

"Supplying the land with water . . . . by means of a system of canals."

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gravity to a system of Bickel float steam traps which discharge directly into the hotwell. Thus the only water and steam which escapes from the system is the small quantity which leaks through stuffing boxes, etc., and that which escapes from the feed water heater. It is the function of the cock and ball float to supply this quantity from the fresh water supply pipe.

At times it would be necessary to operate the plant for twenty-four hours per day and to provide for this possibility as well as to furnish lights for the engineer's residence which was located nearby there was installed an independent generating set, consisting of a reciprocating engine direct connected to a direct current dynamo of sufficient capacity to furnish current for thirty sixteen candle power incandescent lamps. The equipment was complete in every particular, including wiring, fuse blocks, volt meter, etc. The lighting set was arranged so that it might be operated from either the main or auxiliary boiler.

The fuel oil equipment consists of a Moore double fuel oil pumping system, and two galvanized iron fuel oil tanks. The oil system consists of two three by two by three special Snow duplex oil pumps, mounted upon a cast iron drip pan which in turn was supported by cast iron legs of ornamental design. The legs are made in one casting with a cylindrical receiver of large volume having a flanged head bolted thereon. Securely attached to this head is a copper heating coil of large surface consisting of several turns of one and one-quarter inch copper tubing, and in this manner there is formed a combined heater and receiver. The oil from the discharge of the pumps is passed through the heater and the exhaust steam from the oil pumps, themselves, through the heating coils, the oil being heated thereby to a proper temperature before it discharges to the burners. Ample provision is made for drainage and blowing out. The apparatus is self-contained and is complete with hand adjustable oil pressure regulator, polished oil gauge, oil thermometer and all necessary valves, fittings and connections. The oil tanks are two in number, each having a capacity of approximately six thousand gallons, or one hundred and fifty barrels of oil each. The tanks are twelve feet in diameter by about seven feet six inches high, and are constructed of number twelve galvanized iron, riveted together with three-eighths inch rivets, one and one-quarter inch pitch, with all joints thoroughly soldered. The oil system takes its suction from the tanks, returning through the by-pass connection a small quantity, thus maintaining a constant circulation of cold oil, and discharging the heated oil to the burners.

Regardless of the quality of apparatus which enters into the design of a plant of the character under consideration, it has been the experience of engineers that the good qualities which might have been realized, due to a high grade of equipment could be completely dissipated by a poorly designed and constructed system of piping, with its accompanying valves, fittings and connections. The piping system in the present plant represents a high grade of material, workmanship and design throughout. All the main steam piping is made up in shops with flanges of extra heavy weight, screwed on by power and properly pein-hammered, and with machined joints. Special attention was given to the high temperature and pressure of the steam to be used. The gaskets on the main steam piping were of first quality King's Wire Insertion. All gate valves used were of the Chapman manufacture, which represents perhaps the highest type of valve construction for work of the character under consideration. The throttle valves on auxiliaries are of the Lunkenheimer Regrinding Globe Type, and all auxiliaries are double valved. There is placed in the exhaust line between the engine and condenser a Blake automatic exhaust relief valve of the vertical pattern, designed so as to automatically open to the atmosphere should the vacuum bcome lost in the condenser. In this manner serious accidents may be prevented, should the air pump refuse to operate or pressure accumulate in the condenser from any cause, as the valve simply opens and the engine runs under non-condensing conditions until the difficulty is removed.

All auxiliaries, traps, etc., are arranged with suitable by-passes, and the entire piping system is laid out, so as to provide for any unforeseen condition which may arise in operation. After installation, all high pressure piping was tested to a hydrostatic pressure of two hundred and fifty pounds per square inch.

To guard against radiation, piping, fittings, together with the boiler drum and drum heads, and the steam separator, were covered with eighty-five per cent carbonate of magnesia non-conducting covering of about one inch in thickness. All covering was finished with heavy canvas jacketing and wrought iron bands.

The main suction and discharge piping is twenty-four inches in diameter and connects the suction of the main pump with the Salinas River and the discharge with the main irrigation canal. This piping is constructed of three-sixteenths inch steel, closely double riveted with five-sixteenths inch rivets, one and one-half inch pitch. The suction pipe passes through the building and out into the river, where it is supported by a long pier on piles until it finally dips down into the river. Its extreme end is belled to about thirty-three inches in diameter, in order to reduce friction and minimize the entrance head. Upon the discharge of the pump a taper piece is provided, enlarging the discharge from twenty inches to twenty-four inches in diameter. A suction screen is located at the mouth of the suction pipe, which prevents boulders or other objectionable refuse from entering the suction line and injuring the machinery. This twenty-four inch discharge line passes up the river bank and finally terminates in three openings as already described, each of which is equipped with a twenty-four inch flap valve, specially designed so that any two can be bolted firmly in place while the plant is discharging through the third.

The entire plant, as well as the building, is supported upon concrete foundations of substantial design composed of high grade Portland cement, sharp sand, and crushed rock, in proportions of one, two and one-half and five and one-half, respectively. The flooring throughout the building is of concrete about six inches in thickness. All exposed portions of the machinery and building foundations, together with the flooring, were neatly finished with trowel and polished. The building is a wood frame structure, covered with galvanized corrugated iron. It is substantially constructed, well finished and painted throughout.

The contract for this equipment was taken under a rigid guarantee of capacity and efficiency, and the acceptance of the plant was made contingent upon the execution of a demonstrated test.

The test on capacity was entirely satisfactory, the guaranteed quantities being exceeded by about five per cent. The efficiency test was still a greater success. It had been guaranteed that when pumping against the normal head of twenty-two feet there would be developed a duty equivalent to one and a quarter million gallons of water pumped per barrel of oil burned in the furnace. This duty was so easily exceeded on the preliminary test that a final trial was not required and the plant was accepted without further delay.

So far has the equipment above described exceeded the expectations of its owners and engineers, and in fact all of those who have seen it operate, that naught but praise can be heard regarding it. Unique in several details of design, some fears of its successful operation were entertained (by the uninitiated) until its practical superiority was demonstrated, but it is now safe to assume that an investigation into the merits of this type of installation and an inspection of the plant in operation will determine the character and design of apparatus to be purchased by any prospective owner.

Summing up the entire equipment, it can not but be regarded as a first-class, well finished example of the best engineering practice of the times, a credit to its owners and creators alike.

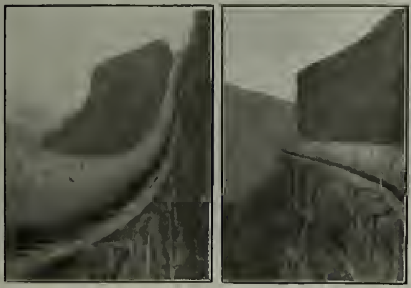
Change in Feeding Stuff Law.

"The New Wisconsin Feeding Stuff Law" is the title of a special bulletin issued by the agricultural experiment station of the University of Wisconsin. This pamphlet gives the text of the present law affecting the sale of commercial feeds in the State, together with a summary of its requirements and suggestions of those engaged in the manufacture or sale of such feeds. Section 1 of the law, defining what shall be included under the term "concentrated commercial. feeding stuffs" is the only one amended, but in this a very important change is made, in that all kinds of bran and middlings are brought within the meaning of the term, and "pure grains ground together" are no longer exempted. Thus practically all mixed feeds used for feeding purposes will therefore have to be registered at the experiment station before they can be legally sold in Wisconsin. Since the feeds now added are the most common feeding stuffs on the market, the importance of the amendment subjecting them to inspection and analysis can be readily appreciated. An exception is made in the case of persons engaged within the State in the manufacture of flours or malt, whereby they are allowed to sell their own make of mill feed at the place where made without having them registered.

Agriculture in Hawaii.

We are prone to think of the island, Hawaii, as possessing a tropical climate. As a matter of fact the average annual temperature is 74 degrees and the highest degree reached in summer along the coast is seldom more than 85 degrees. The winter temperature seldom falls below 50 degrees. For this reason the island is especially adapted for agricultural pursuits. Beekeeping, gardening and small fruit raising are very profitable. Stock raising is carried on quite extensively, and poultry keeping and dairying pay well. Eggs sell at from 25c to 60c per dozen and live chickens from $10 to $15 per dozen. Butter retails from 30 to 50c per pound and milk at 10 or 15c per quart. Besides these industries tropical agriculture can be carried on at a profit. The United States government has established an agricultural experiment station at Honolulu and frequent bulletins are sent out to encourage the industrial development of the territory.

1.—90-inch Continuous Stave Pipe, Pendleton, Oregon



2 and 3.—48-inch Continuous Stave Pipe, near Walla Walla, Washington

4.—48-inch Continuous Stave Pipe, near Walla Walla, Washington

5.—14-inch Machine Banded Stave Pipe, McMinnville, Oregon

6.—14-inch Machine Banded Stave Pipe, McMinnville, Oregon

7.—36-inch Continuous Stave pipe tapered to 20 inch in 18 feet, Walla Walla, Washington

8.—24-inch Machine Banded Stave Pipe, Boise, Idaho

9.—Inside View 6-foot Pipe, Basin, Wyoming

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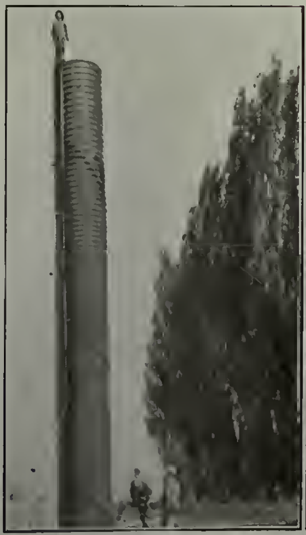

10.—54-inch Wood Stave Stand Pipe 46 feet high, Walla Walla, Wash.

11.—18-inch Machine Banded Stave Pipe, Loaded on Flat Cars

12.—6-inch Wood Pipe Suspended over stream near Lake Chelan, Wash.

13.—Steam Pipe Casing Loaded on Lighter for Seattle, Wash.

14.—6-inch Machine Banded Stave Pipe. Defying Electrolysis. Los Angeles, Cal.

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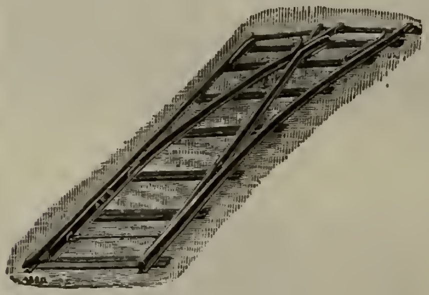
Agricultural Railways.

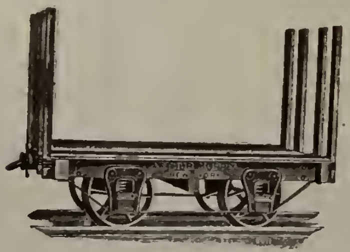
Of late years light railways have come more and more extensively into use for all industrial and agricultural purposes, not only in Europe, but in all parts of the world. The advantages of a light railway over the old fashioned methods of transport in districts where no standard gauge lines are available, are manifold, the principal one being, of course, the economy effected. A horse will haul four times as much on a light railway line as it will on a good cart road, so that the cost of animal traction on a light line amounts to only about a quarter of the cost of animal traction on a well ballasted road. If the quantities to be transported are considerable and a locomotive is substituted for animals, the cost of transport is further reduced to about one-sixteenth of the cost of animal traction on a good road.



For plantations, farms and fruit canneries, light railways have become an absolute necessity on account of the reduced cost of transport as well as on account of the short time in which the cereals can be brought to the warehouse.

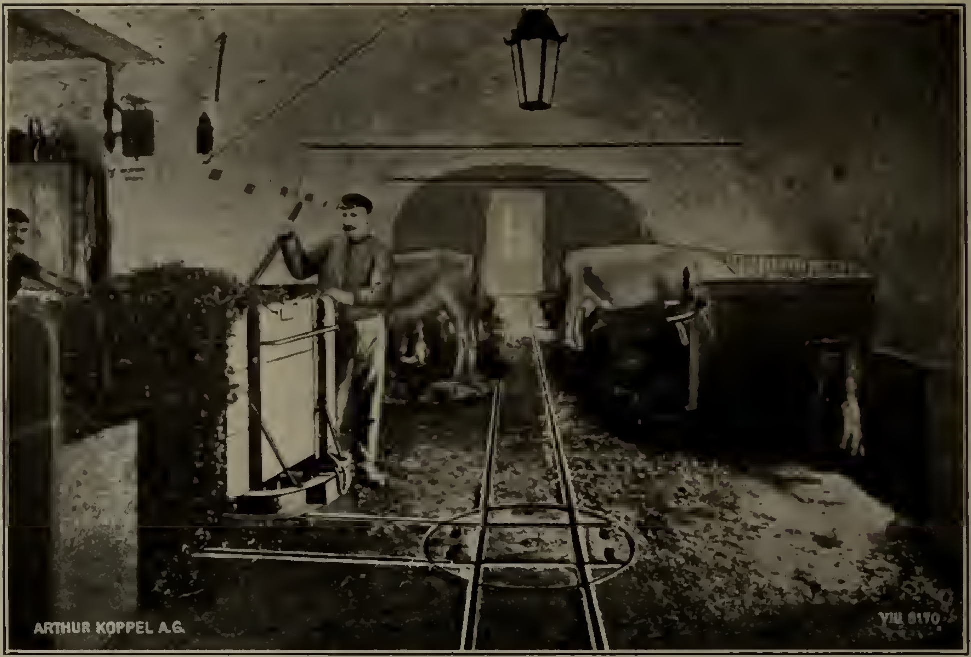
Light railways are divided into permanent lines and portable lines. On most plantations where sugar or cotton are drawn, there exists a permanent line for the bulk of the cotton. This permanent line is usually built with rails weighing from twenty to twenty-eight pounds to the yard, and is carefully laid down on a level road and ballasted, if possible, for locomotive traction. To this main line are connected portable branch lines constructed of light rails weighing from eight to fourteen pounds to the yard, suitable for animal traction. These extensions can be easily removed and connected with the main lines at any other point by means of climbing switches, supplied by the Arthur Koppel Company.

For permanent lines, as well as for portable lines, steel sleepers are strongly recommended and they will have four to five times longer life than wooden sleepers, and are much more economical in the long run.

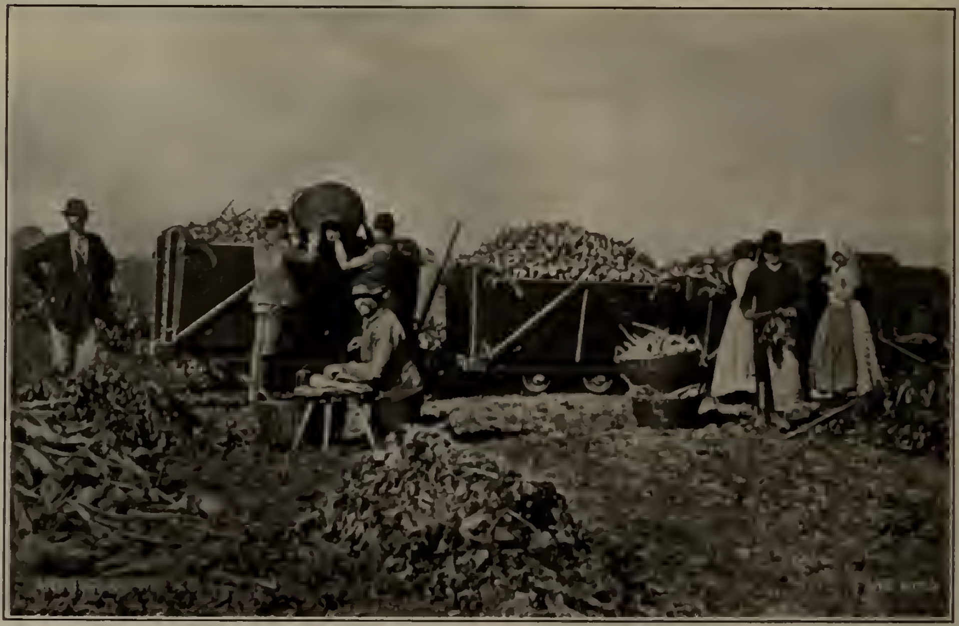


The Portable Railways are usually in sections of five yards, weighing from 140 to 200 pounds per frame complete, so that they can easily be removed by one or two men, thus saving labor and time.

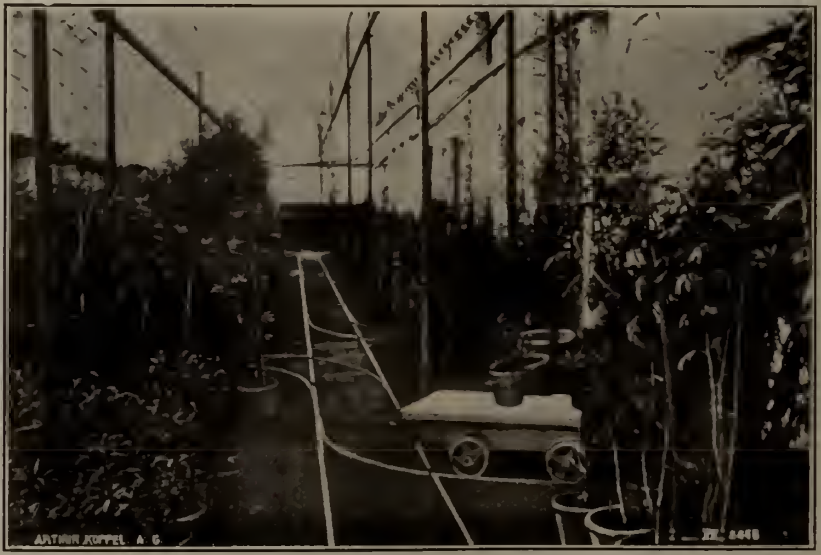
The Arthur Koppel Company, we understand, supply in connection with this straight line, curves, switches, turntables and cars, to make up a complete equipment for the farms, orchards, sugar



Transporting manure in large dairy



Koppel portable tracks and cars in use on sugar beet farm.



Koppel system in conservatory used to great advantage.

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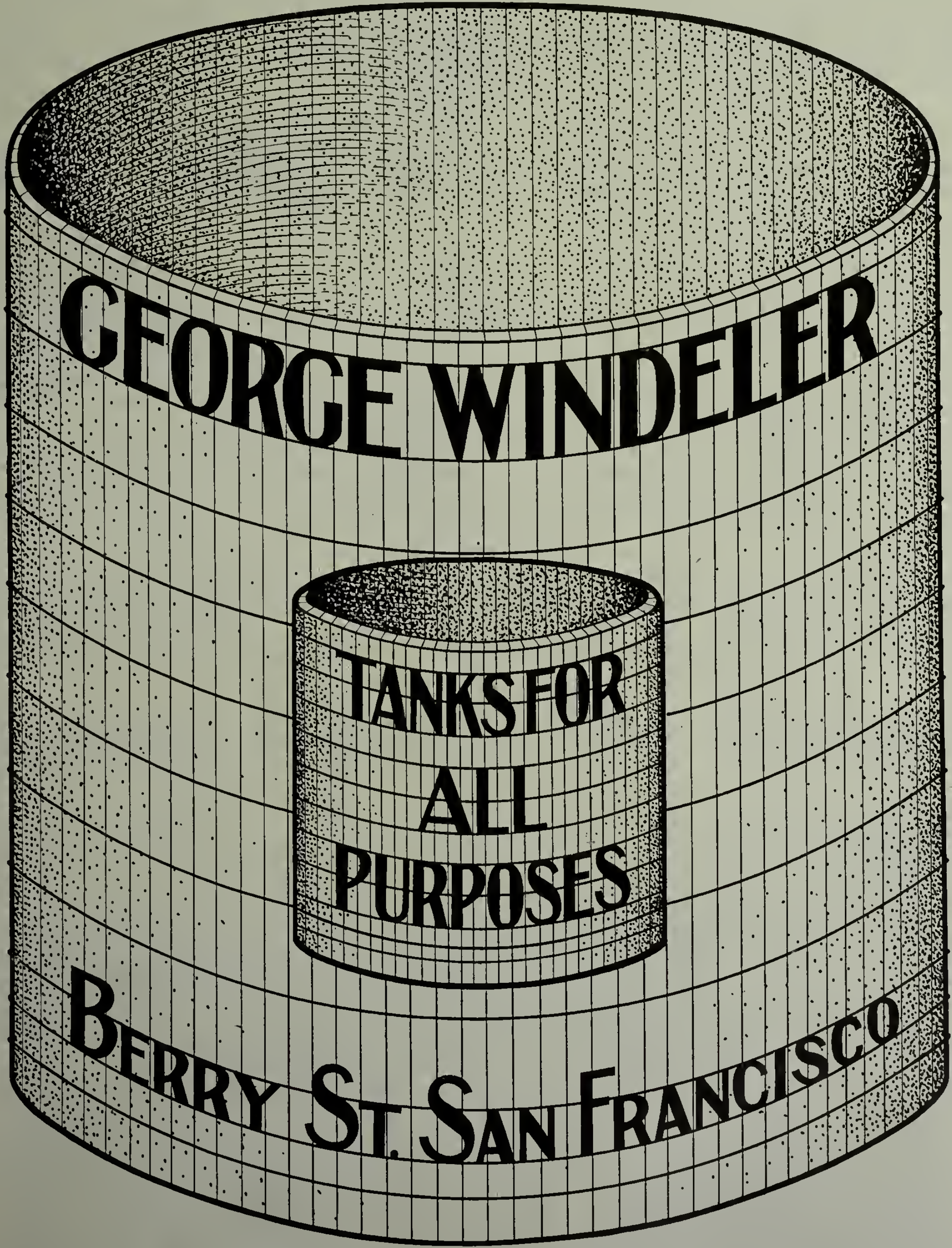

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plantations, beet root, vineyards and orange groves. Their world-wide experience has produced a kind of standard material which can be adapted to any use and can easily be put together and put in service just as a child would put together his toy railway.

We succeeded in getting a few cuts of installations supplied to demonstrate the utility of such portable railway in farm yards and plantations.

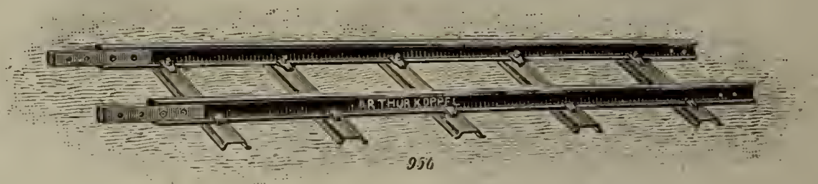


Fig 956

5 or 5½ yards length of track with trough sleepers, plain fish-plates, outside punched up clips and inside loose clips & bolts.

The Arthur Koppel Company has works in this country as well as in various parts of Europe, and has sales offices and stock in all civilized parts of the globe.

The portable railway, which is their main feature in their manufacture, has proved an indispensable article in all agricultural countries.

"For further information see advertisement in this issue."

Prof. Fortier on the Settlement of Lands

Prof. Samuel Fortier, formerly of the faculty of the University of California, but recently appointed to fill the place of Dr. Elwood Mead as chief of irrigation and soil experiments of the United States Department of Agriculture, expressed the opinion before the Irrigation Congress at Sacramento that the staff of experts provided by the government to instruct settlers unskilled in the cultivation of irrigated lands was altogether inadequate. He said that this force, working under the Department of Agriculture, should be increased to at least 1000 experts and that the expense of maintaining an adequate instruction corps should be borne partly by land companies, irrigation districts and State governments, as well as the Federal government.

If Prof. Fortier is right about this lack of experts, and there is no doubt that he knows what he is talking about, this staff should be so increased that every project carried out by the government should be equipped with a proper school of instruction for the settlers. Men that have never done farming of any sort—even city dwellers—must be looked to to form a large percentage of the homebuilders under the projects, and they must be shown the way in order to be successful. There will be many experienced "dry" farmers that know nothing about cultivation by irrigation. The employment of a sufficient number of experts could be carried out by assessing the cost to the maintenance charges of the various irrigated districts. If this is not satisfactory to the settlers, there are other plans under which the expense could be met.

Prof. Fortier expressed the fear that settlement would not be rapid enough upon the government projects to prevent great loss to the government in maintaining them until they are populated. He advocated the giving of every encouragement and assistance to the settlers, and above all of giving them the most time possible in which to pay for their water rights, and also for their lands, where they were not obtained under the homestead law. Settlers should be relieved of all burdens for the first two years at least, he said. Any obstacle that interposed before his improvements were made and his land was producing, might cause failure to the homemaker with little money.

Prof. Fortier is right in stating that settlers should be relieved of every financial burden possible until they are well established. A knowledge that this policy was being pursued would tend to induce occupancy of the lands; but the most important thing is to let the people know about the lands that are open for them and how to obtain them—about the opportunities for comfortable existence that are being developed in the newly watered regions of the fertile West. Publicity is the first thing and the government and associations of landowners and commercial clubs in the towns should bend every effort towards disseminating information about these lands and the coming of irrigation. This special edition of Orchard and Farm will do as much as any other medium and perhaps more toward acquainting the people of this country with the opportunities that are being opened to them. It is such publicity as this publication gives that sets the tide toward the lands.

A dissemination of knowledge about the land that is to give the people homes is the first thing. If the land is good and the water sufficient, those factors will insure success to the settlers and the communities. The most inexperienced farmer will wrest a living, even at the beginning, from his homestead if all the conditions are favorable, and he will learn by experience, even if there is no expert to teach him, but proper instruction at the start will bring him success much more speedily—with much less expenditure of time and money.

Irrigation Spreading Rapidly.

Prof. Fortier sent letters to officials and others in the Western States and Territories asking information as to the acreage of land that would be provided with water rights in 1908. Replies from nine of these showed the following: Reclamation projects, 1,100,000 acres; Carey Act projects, 975,000; district organizations, 400,000; private enterprises, 1,300,000, a total of 3,775,000 acres. Colorado, Montana, Kansas, Nebraska, Oklahoma and Texas are not included. He estimates that with areas not reported, there will be a total of 5,000,000 acres. The United States, with the 10,000,000 acres already irrigated would then have a total of 15,000,000 acres under ditch. It is probable, however, that the total acreage under Reclamation projects for 1908 will fall far short of the total given.

MEN OF THE SERVICE.

The following are the principal officials and engineers that form the personnel of the Reclamation Service:

James Rudolph Garfield, Secretary of the Interior.

Frederick Haynes Newell, Director of the Reclamation Service.

Arthur Powell Davis, Chief Engineer.

Supervising Engineers.

Louis C. Hill, for Arizona, New Mexico, Oklahoma, Southern California, and Kansas, Phoenix, Ariz.

D. C. Henny, for Oregon, Washington, and northern California, 307 Tilford Building, Portland, Oregon; E. G. Hopson, assistant.

J. H. Quinton, for Colorado, Utah, and Nevada, Provo, Utah.

H. N. Savage, for Montana, North Dakota, and northern Wyoming, Huntley, Mont.

Chas. E. Wells, for Nebraska, southern Wyoming, and South Dakota, Mitchell, Nebraska; P. D. Simpson, assistant.

Morris Bien, in charge of land and legal matters, Washington, D. C.

D. W. Ross, for Idaho, Boise, Idaho; Henry L. Lyman, assistant.

Consulting Engineers.

W. H. Sanders, consulting engineer, 915 Grand View Street, Los Angeles, Cal.

A. J. Wiley, consulting engineer for Idaho, Oregon, Washington, Montana, and Wyoming, Boise, Idaho.

O. H. Ensign, chief electrical engineer, 25 Carroll Block, Madison, Wis.

C. H. Fitch, executive officer and chief auditor, Washington, D. C.

Chas. S. Slichter, consulting engineer on underground waters, 636 Francis Street, Madison, Wis.

W. H. Code, chief engineer Indian irigation, Hollywood, Cal.

W. W. Follett, consulting engineer, International (Water) Boundary Commission, El Paso, Tex.

B. M. Hall, consulting engineer.

L. H. Taylor, consulting engineer.

Among the extensive district engineering force are the following named:

Yuma Project.—F. L. Sellew, project engineer; E. D. Vincent, in charge of Laguna dam construction.

Uncompahgre Project.—I. W. McConnell, project engineer; E. E. Sands, H. L. Daniels and A. F. Ross, associate engineers.

Payette-Boise Project.—J. L. Savage, office engineer; F. C. H Horn, J. T. Burke, Edward Hedden and James G Camp, engineers in charge of construction.

Minidoka Project.—W. G. Bavies, assistant engineer in charge of farm unit laterals and G. H. Hogue, assistant.

Garden City.—C. S. Slichter, in charge of investigation of movement of underground waters; H. C. Wolff, assistant engineer.

Milk River Project—C. C. Babh, engineer in charge.

Lower Yellowstone Project.—F. E. Weymouth, engineer in charge; Charles H. Paul, construction engineer.

Sun River Project.—S. B. Robbins, engineer in charge; James A. French, in charge of Fort Shaw unit, and E. C. Gersbach, assistant engineer.

Huntley Project.—R. S. Stockton, engineer in charge; C. E. Goodwin, chief assistant.

North Platte Project.—Andrew Weiss, project engineer; H. W. Dietz, assistant; Burt E. Forbes, in charge of diversion dam construction.

Truckee-Carson Project.—R. R. McGregor, project engineer; L. M. Holt, assistant engineer; T. H. Means, engineer in charge of irrigation system.

Carlsbad and Hondo Projects.—W. M. Reed, engineer in charge; L. E. Foster, engineer in charge of water distribution.

Rio Grande Projects.—H. J. Gault, constructing engineer; Leasburg division.

Williston District Projects.—H. A. Storrs, electrical engineer; G. E. Stratton, project engineer, Williston Project; Geo. O. Sanford, project engineer, Buford-Trenton Project; A. T. Nelson, and Rollin Ritter, assistant engineers.

Umatilla Project.—John T. Whistler, project engineer; H. B. Newell and H. W. King, associate engineers.

Klamath Project.—D. W. Murphy, project engineer; William Sargent, engineer constructing Keno canal and W. H. Helleman, in charge of irrigation operations.

Belle Fourche Project.—R. F. Walter, engineer in charge; W. W. Patch and W. W. Schlecht, associate engineers.

Strawberry Valley Project.—J. L. Lytel, project engineer; W. D. Beers, assistant.

Yakima Valley Projects.—Joseph Jacobs, district engineer; C. H. Swigart, assistant; W. N. Granger, George G. Mair, C. Casteel, C. W. Paine and Christian Anderson, in charge of construction. Okanogan, Sunnyside and Tieton projects embraced.

Shoshone Project.—Jeremiah Ahern, project engineer; G. W. Cole in charge of construction of Shoshone dam and G. C. Emerson of Corbett tunnel.

Orland Project.—T. H. Humphreys, Project engineer.

Salt River Project.—Chester W. Smith and J. W. Martin, constructing engineers.

Experts and Specialists.

Land and Legal Matters.—Morris Bien, supervising engineer in charge, Washington, D. C.; A. E. Chandler, engineer; J. M. McKinney, examiner.

Auditing and cost keeping.—C. H. Fitch, chief auditor, Washington, D. C.

Transportation.—E. T. Perkins, engineer in charge, 876 Federal Building, Chicago, Ill.

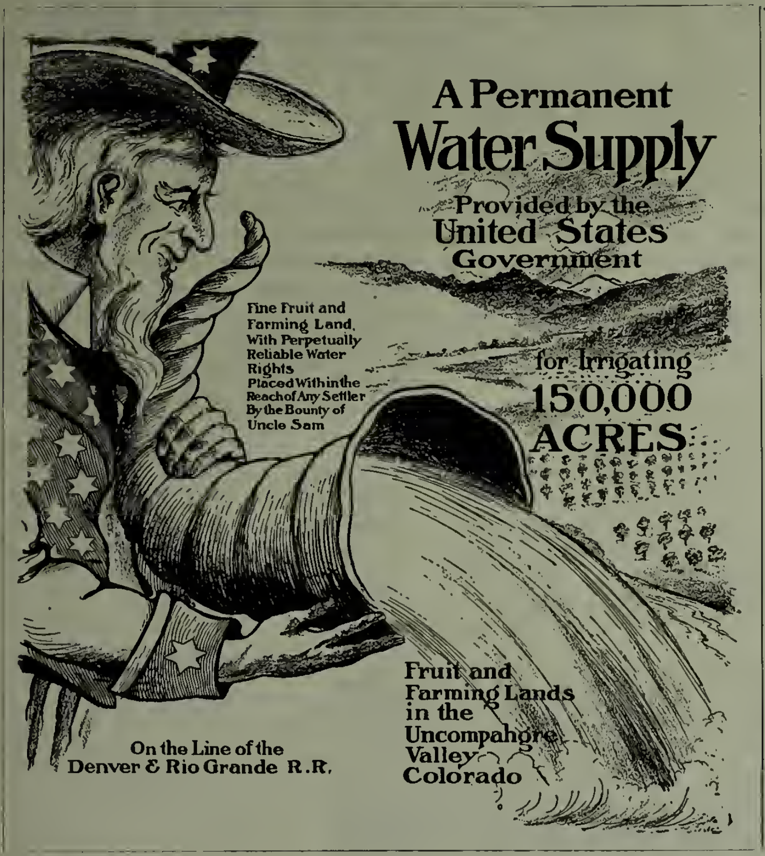
Supplies and equipment.—E. G. Paul, engineer in charge.

Drafting and map reproduction.—H. V Lemenager, chief draughtsman.

Technical Review.—F. W. Hanna, engineer in charge.

Cement tests.—J. Y. Jewett, Cement Testing Laboratory, Armour Institute, Chicago, Ill.

Statistics.—C. J. Blanchard, statistician.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¶ For those who desire to make new homes, there is no other region that offers better advantages than western Colorado—a land of blue skies and sunshine, with a temperate and even climate, where the erstwhile desert needs but to be tilled and watered in order to verily "blossom as the rose." Several illustrated publications, giving valuable information in regard to the agricultural, horticultural and live stock interests of this great western section, have been prepared by the DENVER & RIO GRANDE RAILROAD and can be obtained by addressing

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TO CONTRIBUTORS.

The columns of Orchard and Farm are open to discussion on all topics relating to the interests which the paper represents. Contributions are solicited from our readers.

GUY H. STOKES.................Managing Editor

Entered at San Francisco Postoffice as Second-Class Matter.

VOL. VI. No. 10.

All Drafts or Money Orders Made Payable to Orchard and Farm

U. S. and Foreign Representative - - E. KOTHE

Homes on Government Lands.

It is timely to discuss some phases of Uncle Sam's home-finding features, for the era of untrodden wilds is over, that of reclamation at hand. This issue of Orchard and Farm is devoted almost wholly to irrigation, reclamation, and like subjects, and the reader can find almost any information he wants in the voluminous discussion presented, throughout these pages.

As many readers of Orchard and Farm are interested in Government projects, public lands, and germane matters we submit a few facts here:

Homes for 35,000 families will be provided in the Northwest by Uncle Sam during the next year, when the Government will open to settlement 4,910,000 acres of timber, agricultural and mineral land in Eastern Washington, Northern Idaho, Western Montana and South Dakota. The occupation of these lands, situated in eight Indian reservations, will mark the most important period of development since the first railroad invaded the forests, valleys and sagebrush deserts, west of the Rocky Mountains, and means the obliteration of the frontier with its picturesque cowboys and the vivid, adventurous heroic days, which will never again have a counterpart in this country. The lottery system has been decided upon in the disposition of these reservation lands, which are located as follows:

Colville, Eastern Washington, 1,000,000 acres; Yakima, Central Washington, 1,145,000 acres; Coeur d'Alene, Northern Idaho, 310,000 acres; Lemhi, Central Eastern Idaho, 500,000 acres; Blackfeet, Southern Idaho, 500,000 acres; Flathead, Western Montana, 1,000,000 acres; Rosebud and Lower Brule, South Dakota, 891,560 acres.

The Lower Brule Reserve, comprising 56,560 acres was the first to be opened. Homeseekers had until October 7 to file applications for lottery tickets in the drawing which took place at Pierre the following week. Each applicant had to go to the Pierre land district and make oath on his ticket that he was entitled to take public land under the homestead laws. If successful in drawing a homestead he paid or agreed to pay the Government the appraised value of the land, in annual installments. The value is placed at from $1.25 to $4 an acre.

In the Coeur d'Alene Reservation, beginning seventeen miles east of Spokane, land can be taken under the homestead or mineral laws. The survey is being made, and when completed the Government will allot to the Indians their share and then classify and appraise the surplus amounting to 10,000 acres, and order the lottery. Settlers will not be able to work their farms until the spring of 1909, as it will require a year to appraise the lands.

The most important tract to be opened is in the Yakima country where 1,145,000 acres of land will be disposed of in various ways. The Government is constructing an irrigation plant to cover 100,000 acres of land. The irrigated tract will be divided into 40-acre plats. The settlers will be required to pay in 10 yearly installments the amount of money the Government put into the project. This will make the land cost the settlers $30 an acre. It will be used chiefly for sugar beet and alfalfa culture. The timber land on the Yakima Reservation will be sold under the sealed bids. All other land, except mineral, will be awarded under the homestead act. The allotments and schedule of reserved lands have been approved and the land commissioner is ready to open the reservation just as soon as the reclamation project is completed. This will be in time for cultivation of crops next year.

Surveyors in the employ of the Government are at work in the Colville reserve. In addition to dividing 1,000,000 acres of land into 40 and 160 acre tracts they will survey several townsites. Part of the land is to be under irrigation and in this district the farms will be limited to 40 acres, others being 160 acres. All the land will be classified and appraised as irrigable, grazing, timber, mineral or arid.

Work is progressing so rapidly on the Lemhi reservation that it is announced the lands probably will be opened to settlement this fall. The Indians on this reservation have been removed to Fort Hall and all that remains to be done is the appraisement of the improvements. The appraisers will be appointed within a few weeks. The old homestead law will govern the opening of these lands and settlers will not have to pay more than from $1.25 to $2.50 an acre for tracts.

Surveyors are also at work on the Blackfeet Reservation. The first work is to set aside allotments for the Indians and then survey the surplus 500,000 acres together with Government townsites. The Government has the right to withdraw part of this land for an irrigation project, but so far there is no disposition to do so.

The work of making the allotments to the Indians will begin this fall, and officials say the opening may be delayed until the spring of 1909.

Most of the Indians on the Flathead Reserve have been allotted their land and the Indian commissioner will soon appoint appraisers to fix the value of the million acres of surplus land. It is the intention to classify this land into first and second class agricultural, timber, mineral and grazing land. The survey is practically completed, and it is expected to open next year to enable the settlers to put in a crop. However, the opening may be delayed until fall if the work is not completed this winter.

Nine months more will be required to complete the allotment of the Rosebud land to Indian children, but as soon as the work is completed the 835,000 acres of surplus lands can be opened to settlement. Several townsites are to be located by the Government on this reservation.

Concerning Agricultural Colleges.

Whoever follows with even ordinary interest any of our almost innumerable journals devoted to the tillage of land and stock raising must be struck from time to time by the frequent references made to agricultural colleges. There is little wonder for this; the work they do is a good one, and their number is increasing.

Strange to say, there are men still who ask doubtingly of what is their use? The chances are we shall never be without some such Thomases. But, in the main, it is "the people" who are generally right. And it is by the will of the people and for the good of the country, the experiments carried on in these public institutions are being extended in scope and accumulated value.

The land area of the United States is something immense, the multiplicity of conditions surrounding every branch of farming bewildering beyond measure. And as time goes on and land works out of the old pioneer stages and methods, the demand for increased knowledge, both scientific and practical (though they are really one and the same thing), becomes greater and more urgent.

The days of plowing virgin soil, to be sure, are not yet ended and the chapter in our history telling of the golden harvests that Mother Nature so bountifully bestowed on those early settlers is not yet finished. We can remember the tales of Nebraska and the Middle West. But to the brave, freedom-loving pioneer, the taking-up of new land and the building-up of a new community is still possible; and he deserves all that the soil in its glorious flush of youth can give to counterbalance the hardships ever attending his line in life. For the pioneer and immigrant are seldom blessed with a stock of knowledge (their experience being often useless) to aid him otherwise. To this lack the ruin of thousands of farms to-day is due. Are not thousands of men suffering for the sins of their sires in raising, for instance, wheat after wheat, year after year, without thought of what must naturally result? Proper manuring was never considered necessary in those days, and the very best of soils must in course of time be impoverished of its essential nitrogen and phosphates.

Lack of knowledge, and disobedience of her laws are sins against Nature which never go unpunished. Whenever anyone takes to agriculture, whether for profit or pleasure, he has more need of the powers of close observation, a well balanced reasoning mind, and an insight into more branches of science than in almost any other profession he may choose. Let us ask ourselves: How many things come from the earth—we mean the neces-

Baker Irrigation Company's System, A Private Project

The canal of the Baker Irrigation Company is taken out of Powder River about eight miles south of Baker City, and after following the tortuous contour of the valley and the hillside for a distance of twelve miles, reaches the reservoir site one mile east of the city. Along a good portion of the mountain side above South Baker the canal has at great expense, been cut into solid rock, thus obviating the use of a cheaper but more temporary plan of wooden flume. At one point near Sutton Creek a long line of wooden flume has been dispensed with by making an immense earthen fill. The water of the canal is carried under Sutton Creek and under the track of the Oregon Railroad and Navigation Company by what is probably the largest inverted syphon in the northwest, it being a double riveted No. 10 steel pipe 48 inches in diameter, through which the water flows dropping ninety-three feet on the northeast side of the creek and railroad and raising ninety feet on the opposite side and flowing on through the canal three miles further where it reaches the city limits of Baker and passes through a six hundred foot tunnel.

The canal and reservoir of the Baker Irrigation Company, will, when completed, be one of the most expensive and, at the same time, one of the most complete irrigation systems in the northwest. The embankment for the retaining wall of the reservoir will be two thousand feet long, fifty feet high and three hundred and fifty feet wide at the base of the deepest point. It will differ from the ordinary form of earthen dam in this, that, whereas there is usually a puddled core or wall in the center of the embankment, in this case the entire dam will consist of puddled earth, the material being all put in place by the sluicing method which is made possible by the canal being about fifty feet higher than the top of the reservoir, thus furnishing a sufficient head of water and sufficient grade for piping or sluicing. This plan of building is known as the hydraulic fill and makes an embankment that is extremely firm, and with the great thickness of the wall will make a reservoir that will last through the ages. The reservoir will cover an area of two hundred and forty acres, making a great artificial lake, and the ground surrounding the lake will be improved and made into an attractive park, where boating in the summer season and skating in the winter on the lake will furnish attractive amusement to residents of the city and surrounding country.

This irrigation system when fully developed, will furnish water to irrigate between 8,000 and 10,000 acres of land. The plan of the company is to fill their reservoir during the latter part of the winter and early spring, and irrigate direct from the river during the flood season, and when the flood season passes to draw from the reservoir which will hold sufficient water for irrigation as long as the growing season lasts. The provision for all summer irrigation will make for the portion of Baker Valley which it covers, an intensive cultivated section, and it having a warm western exposure to the sun and consequently a longer growing season, with warm water for irrigating, will make one of the most productive districts in the entire northwest.

The water which will be held stored in the big reservoir for late irrigation, after becoming warmed through the summer season, will be particularly advantageous for fruit culture and market gardening, a class of farming which this tract of land will be largely used for. All varieties of fruit and all classes of vegetables produced in the north temperate zone, can be grown in immense quantities. Many carloads of fruit mostly apples and pears have been shipped this season to Kansas City, St. Louis and other Mississippi Valley points. A large acreage of fruit has been set out during the past few years and a great impetus has been given the fruit business of the valleyby the building of this water system; and such an area will be planted in the spring on the Baker Irrigation Company's Sunnyslope fruit tracts that will make the fruit business a leading industry of the valley, and it will be but a short while until Baker County will be the leading fruit shipping county in the state.

Looking down the Valley from the Reservoir, showing Sunnyslope to the right.

The fact that good transportation facilities will be given by the Eagle Valley Railroad which is now building, and that the Interurban Electric Line will probably go through this body of land, will make it an ideal spot to build up a suburban home. The raising of high class products will eventually make this the garden spot of this portion of the state. The soil has been pronounced a perfect one for sugar beet culture, by an expert from one of the beet sugar factories, and a thorough test will be given, as several acres this year have been planted to sugar beets. No better market can be found anywhere in the country than is afforded by Baker City, and the mining country tributary to this tract of land. The near location to the city with high school and business college facilities and excellent social advantages, make it a most excellent place to build up a home and raise a family, or for those advanced in years to spend their late years amidst pleasant surroundings.

COME TO BAKER CITY, THE METROPOLIS OF EASTERN OREGON

and purchase at the opening price a 5, 10 or 20 acre tract of irrigated land on

The most healthful climate, the best market and the most magnificent scenery.

SUNNYSLOPE

THE GARDEN SPOT OF THE NORTHWEST

The warmest part of the most productive valley of the richest county in the Great Northwest.

Fine apple, pear, cherry, berry and vegetable land under the most complete irrigation system in the northwest. **SUNNYSLOPE** is only two miles from Baker City, a beautiful city of 10,000 population. If you wish a home where maintains the greatest degree of healthfulness amidst surroundings of the most magnificent scenery, where cyclones and blizzards are unknown, write for particulars to

BAKER IRRIGATION CO., Baker City, Ore.

You pay for your land in Six Annual Payments.

Prices will advance January 1st.

sary things of our daily life? Does not the existence of the whole world rest in the soil and its cultivation? On the study of the soil, then, and the proper use of it depends the fate or fortune of every nation. And it behooves every farmer to use his land to the best advantage, not only for himself, but for his country and them that come after him. It is to this end that in every agricultural college the course of study embraced in the prospectus is so comprehensive that the thoughtless reader is struck with dumb amazement at its diversity.

So valuable, indeed, are these institutions to the commonwealth that I would say without fear of contradiction it would be better for each state if she appropriated for their use more, far more, money, whereby the experiments could be carried out on a more extensive scale and the training of the young farmer could be made more effectual. No one knows this better than those who are engaged in the work or have gone through one or other of these institutions.

To the writer, it has always seemed that great as is their benefit directly derived by the students attending the lectures, more important still are the experiments carried on scientifically and with the thoughtful care of their trained staffs. By these, and the wide spread publication of the results of these, the great farming community receive the most advantage. The American farmer does considerably more technical reading than his city brother—he spends more winter evenings by his own fireside. And these experiments are certain to attract his interest and attention, on one subject or another. Cattle, horses, sheep and pigs have their ailments; so likewise have crops, whether grain, fodder, roots and fruit. The best stock to raise, the best variety of crop to grow, the why and how; all these are matters which touch him and his family's welfare at every turn. A man is a fool if he thinks he can farm and make money without running against snags. He is bound to make mistakes, he must have some losses like other folk, and as for snags they are inevitable. Last experience won't always help him out of difficulty. Hence the use of some other fellow's experience and other knowledge than his own. Therefore, it is, we see in every journal devoted to his interests the innumerable questions in each issue asked and answered, while the result of every experiment made is watched by thousands with the keenest interest. The mail bags are full of inquiries concerning them. And the free distribution of seeds and advice to any and all applicants from these centers of knowledge have proved of incalculable benefit not only to the farmer himself, but to the whole nation. Knowledge is power.

Fortier Tells How To Irrigate.

The committee appointed by the Boise Irrigation Congress to disseminate practical and scientific information concerning irrigation, has issued a valuable pamphlet, known as Bulletin No. 4, containing an article on irrigation practice on the Pacific Coast, by Professor Samuel Fortier, in charge of drainage investigations on the coast for the United States Department of Agriculture. This committee consists of Professor Fortier, chairman; Frank C. Goudy, Denver; Dwight B. Heard, Phœnix; F. H. Ray, Helena; C. R. Reeves, Ely, Nevada; and L. G. Sinnard, secretary, San Francisco. Professor Fortier's article contains the following "hints on irrigating different crops":

Alfalfa is irrigated by means of borders and checks in California, checks in Oregon, and furrows in Washington. Even in such diverse methods there are features common to all. Young alfalfa is a very tender plant, and its early treatment must be such as to avoid caking the surface soil, too little or too much soil moisture, and too rank a growth of weeds. Irrigating very young alfalfa is ruinous in most soils. It must be seeded when rains or irrigation have supplied enough moisture to the soil to support the plant till it shades the ground. In Washington and Oregon a nurse crop is often used to advantage.

The best rule is to irrigate alfalfa in such a way as to allow no breaks in its steady growth. In some places this is best accomplished by irrigating as late as possible before cutting, and not after cutting. Where the weather is very hot newly cut alfalfa may be scalded if flooded, and some soils will bake very hard if watered when the soil is so little shaded. In other places it is the universal practice to irrigate after cutting.

The important point in irrigating beets is to have the land laid out with enough care so that no water will leave the furrows. Caking of the surface chokes the beet even after it is half grown, and will kill young plants. Caking may be largely prevented by using a small stream in a deep furrow. The usual practice is to turn 5 to 10 miner's inches into each shallow furrow, and to assume the irrigation complete after one or two hours if the stream has reached the lower end. A better plan, in suitable soil, is to turn in less than one miner's inch, (a miner's inch is a little more than 11 gallons per minute), and permit it to run 12 to 24 hours. Deep cultivation between the rows is to be recommended, both in order to soak the water deeper into the ground and to give the beet room to expand laterally. In some porous soils it is an aid to irrigation to drag a log through the furrows before applying water, to compact the sides and bottom. Longer furrows can then be used.

The same general rules apply to the irrigation of potatoes and other root crops. The best potatoes are raised from seed grown on unirrigated land. Ideal moisture conditions are attained when the moisture around the roots of the potato is gradually increased until the plant blooms and the tubers are formed, and is then as gradually diminished until the crop is harvested. This ideal may be approached by skillful irrigation and thorough cultivation.

In irrigating vineyards as little water should be used as will produce normal healthy growth. Water should only be applied when persistent cultivation fails to conserve sufficient moisture in the soil. Irrigation is usually required for young vines in their first year of growth, and in later years when the mature vines yield heavy crops, spring irrigations are beneficial. The furrow method is recommended.

Orchards should not be set in any but deep and fertile soils, and in making suggestions as to orchard irrigation, such soil is assumed. The object of the orchardist should be to train the roots outward and downward, and this can be done by proper irrigation. In all warm localities the upper six inches or more of the soil should be kept as a dust mulch. Roots that are lured into this layer by the winter rains will later perish by drought. Hence the only proper way to irrigate is to apply the water in deep furrows with a considerable interval between irrigations, and to cultivate deep and often.

Bulletin No. 4, which is of value to irrigation farmers, may be had by addressing Mr. Sinnard, Room 946, Flood Building, San Francisco, California.

POWER FROM WATER AND WIND.

Speegle Current Wheel on Exhibition on Lobos Creek Will Produce Energy at a Trifling Cost.

The Speegle Horizontal Current Wheel Power Company of this city has perfected and is manufacturing a power device to be operated without expense of any moment by the currents at headgates and falls in canals, by other streams and by wind power. This invention gives a means of supplying a great quantity of cheap power. A picture of the invention appears on page 169.

The wind machines may be operated on any eminences where the velocity of the wind is above the ordinary, and it is planned to develop a great deal of power through them on such places as Twin Peaks and Mount Diablo in the near future. One of these wheels is in operation at present in Lobos Creek, at the bay shore, near Twenty-Fourth avenue and is an object of much interest. Many persons go there to watch its operations. The company asks full investigation and invites every body to visit that place between the hours of 1 and 3 in the afternoon and view the wheel.

The Speegle Company is incorporated under the laws of Arizona with a capital stock of $1,000,000. The stock is non-assessable. E. A. Speegle is the president and treasurer of the corporation and Louis E. Speegle, vice-president and secretary. The office is in room 603, Hibernia Building, 11 Jones street, next to the Hibernia Bank, San Francisco, where information concerning this remarkable power wheel may be obtained.

The advantages of the Speegle Horizontal Current Wheel are that it can be used in irrigating canals—in headgates and drops—for developing power for any purpose without interfering with the passage of the water; it will give power direct for generating electricity, crushing barley or other cereals, chopping feed, running separators for creameries, pumping water from wells for domestic uses, draining overflowed lands by pumping water from those that are too low to admit of drainage and pumping water upon lands that are too high for running lateral ditches from the main canals.

The whole or any part of any waterfall or running stream, such as a river, creek or canal may be utilized by using this wheel, without diverting the water from its regular channel.

The velocity of current, providing there is volume of water, presents no obstacle to the development of high power by the wheel.

The wheel will also develop power from the ebb and flow of tide water, waves and breakers, as well as from wind.

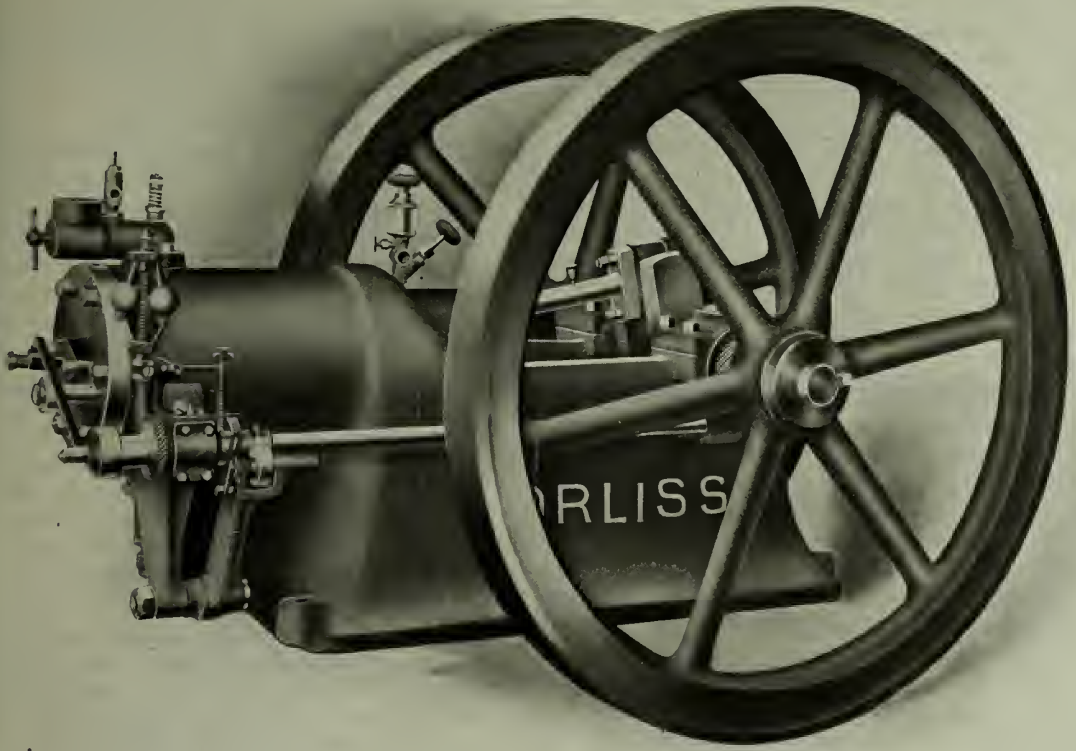
The Speegle wheel can be made of any dimensions, from a few feet to hundreds of feet in diameter, thereby creating electrical energy from wind for interurban railroads and for any power purpose.

In utilizing running streams for power, whether large or small, the company will construct a wheel in the stream, using all the flow for whatever power there may be in it at that point, create electric energy and send it down the main line, install wheel after wheel and create a like quantity of electrical energy from each wheel. So, while a start may be made with only a few horsepower, the valley will be reached with thousands.

The company claims and says it can demonstrate that this power wheel can be constructed, operated and maintained much more cheaply than any other existing device for creating power from any source. In substantiation of these claims, it submits the following figures:

Cost of a twenty-five horse power steam engine	$835.00
Cost of operating a twenty-five horse power steam engine for pumping purposes is as follows:	
Fuel per day of 24 hours, 2 tons of coal at $10 per ton	20.00
Oil and waste per day	1.00
Attendance per day of 24 hours	7.00
Total cost of operation per day	$ 28.00
Cost of a 25 horse power gasoline engine	$925.00
Cost of operating a 25 horse power gasoline engine is as follows:	
75 gallons of gasoline used in 24 hours at 17c gallon	12.75
Oil and waste per day	1.00
Attendance for 24 hours	6.00
Total cost per day	$ 19.75
Figures taken from Water and Forest, January 7, 1904.	
25 horse power Speegle horizontal current power wheel will cost approximately	$750.00
(Depending principally upon foundation. Wheels are built from 1 h. p. up).	
Oil and waste 24 hours	.50
Fuel	none
Attendance for 24 hours	none
Saving in operation and maintenance of 25 horse power Speegle horizontal power wheel, as compared with 25 H. P. steam engine per month	825.06
(Or more than the cost of the Speegle Power Wheel).	
Saving in operation and maintenance of a 25 H. P. Speegle Power Wheel as compared with the 25 H. P. Gasoline engine per month	577.50
(Or very near the cost of the Speegle Power Wheel).	

A limited number of shares of the capital stock is offered investors at 25 cents a share. The company owns all the patents and other rights in the invention. We solicit orders from people who need power for any purpose.



CORLISS GAS ENGINES

For high duty irrigation work or other power purpose. They are operated with either gas, gasoline, distillate or crude oil and give the highest possible efficiency with the least trouble.

The Corliss Engines have been manufactured in San Francisco for the past 25 years and have stood the test of time.

All sizes from 8 to 100 horse power. For further particulars address,

THE CORLISS GAS ENGINE CO.

227-229 Folsom Street, San Francisco, Cal.

No more Flood or Phelan Buildings to be built by Nevada mining men. We shall build NEVADA for NEVADA and out of NEVADA ORE

Are You Thinking of Coming to Nevada?

If so, you have Reno in mind of course. We have choice acreage CLOSE IN suitable for SUB-DIVISION, Vegetable or Chicken farming. Now in alfalfa and harvests $50 per acre. Planted in vegetables or small fruits will bring $400 per ACRE each season. NO CROP FAILURES HERE.

Also choice homes and building lots in Reno. Close in. *Small monthly payments and easy terms.* Give us an idea as to what you want and we will please you.

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Open day and night. Best service in city our specialty. Orchestra afternoons and evenings.

Everything Good to Eat

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RENO, NEVADA

Turlock (Cal.) An Irrigated Eden of Happy Homes

By C. H BRONAUGH

WITH the approach of the rainy season the farmers of the Turlock Irrigation District are building houses, barns and other buildings with increased activity. Never in the history of the district have so many homes been built as have been erected by the successful and prosperous growers of this section. Every road running into Turlock presents a scene of industry. Wagons by the hundred are coming and going to and from this place. Those coming to the town are loaded with produce and those returning often have lumber, paints, and other building material, for the Turlock Irrigation District farmer likes to have his home look nice as well as the city dweller and does not hesitate at expense when a number of dollars will give his domicile an attractive appearance and add to its value as well.

I counted seven new houses within a distance of a mile on one road west of town, where last year there was but one. On another road there were more than this and more people will own homes during the next two months, or as soon as they reach California from other States. Many ten and twenty acre ranches have been sold and these people are coming as soon as they dispose of their crops raised during the past year on Eastern farms. People who have lived in many States and have seen communities grow rapidly are surprised at the amount of building going on here and say it surpasses all records.

There have been seventy-five cottages erected in Turlock itself during the past summer and there are at least twenty being built at this time. The town is trying to catch up with the country, but is away behind up to this time. As long as the rich country back of this point is ahead of the town, the dwellers within the gates of the latter are satisfied. Turlock is not building too fast, and business in every line here is in the most flourishing condition. The word failure has been torn from the dictionary of the Turlock man, and everything points to a most prosperous winter season.

Fully $250,000 have been spent in new buildings here within the past six months. Dozens of carpenters have been at work, and there is enough work in sight to keep all of them busy all winter. The new St. Elmo Hotel, erected at a cost of $35,000 is a three-story structure and will be ready for occupancy within the next sixty days.

The Hultberg & Lane brick block is nearly finished and this firm is now moving in. It will be one of the handsomest structures in this place.

John Gall is to begin a brick building for a new drug firm which comes from Merced. They will be in their new home by the latter part of November.

The Methodist Church people have let the contract for a handsome $5,000 house of worship, which will be erected at once. This building will be modern in every respect, will seat 450 and will be built in bungalow style. Rev. Martin Hilbish is the pastor.

Turlock intends to incorporate as a city. The necessary preliminaries, such as advertising and the presenting of petitions to the Board of Supervisors, have been gone through with, and unless we mistake the temper of the people the town will step to the ranks of California cities within a very short time.

The question of public lighting, water and sewer systems for Turlock is to be decided within a very short time. These matters are now being discussed and it is probable that the town will have these very necessary adjuncts to every progressive place within a very short time. Local capitalists have these matters in hand, and they have the money to push things through to a successful conclusion.

The La Grange Dam.

Your correspondent accompanied the members of the Board of Directors of the Turlock Irrigation District to the La Grange dam, the source of the water supply for the Turlock and Modesto districts, a short time ago and found everything in first-class condition. Of course there is a great deal of repair work to be done during the coming rainy season, but the water could be turned into the main canals and laterals now and run another year without more repairs if it were absolutely necessary.

The dam is an engineering wonder that is worth traveling across the continent to see. Last spring, when the Tuolumne River, from which the two districts get their water for irrigation, was the highest, fifteen feet of water was going over the dam. The dam is 127 feet high, and with such a vast amount of water going over the dam it must have looked like a veritable Niagara.

A high line canal, to be taken out a few miles below La Grange, is being surveyed, and it is hoped that the ditch will be built the coming winter. This canal would cover at least 10,000 acres of very fertile land, and would bring in quite a large revenue. It is estimated that the cost of the canal will be about $80,000.

The farmers and producers of the Turlock Irrigation District are to incorporate with a capitalization of $100,000 for the purpose of erecting and maintaining packing plants, receiving the best prices to be obtained for their products, and doing all in their power to inform themselves as to the state of those markets, with daily quotations from the leading cities of the country, and to place men in different markets to look after their produce on arrival. A meeting has been called for November 2, when it is hoped to perfect the organization and elect officers. Several thousand dollars have been raised by subscription and there are few people in the district who do not admit the excellent purposes of the proposed association. It is to be hoped that the association will be formed and that it will prove to be a splendid success.

Sweet potatoes continue to pour into the market here and are being shipped to the leading cities of the Pacific Coast. The market price of sweets has dropped to $1 and $1.10 per hundred, hence the residents of the larger cities may now have the chance to indulge in these delicious tubers without feeling that they must draw on their bank accounts very heavily—that is, if the commission men of those cities do not put on too heavy a commission for their labors in handling. Rumors have sifted down to the people here that the buyers in the large cities have been compelled to pay six to ten cents per pound for their sweet potatoes. If this is true they should send direct to Turlock and get them in quantities for considerably less. It is estimated that over 300 carloads have been shipped from here within the past six weeks. The quality is unsurpassed anywhere.

Rocky Ford Cantaloupes.

The cantaloupes to be planted next year will be of the Rocky Ford and another variety known as the Burrell Gem. The latter is a red meated melon, an excellent keeper and shipper. The prices brought on the Chicago and New York markets for this melon the past season were in advance of the Rocky Fords, and they made a hit on the Eastern markets. A large acreage will be planted around Turlock.

Many of our farmers will plant peas for the early March market next month. A local commission man says he will take all the peas offered in March and April and guarantee good prices. Another crop that will be planted largely is onions. These will be planted early in November and be harvested in the spring when the market is comparatively bare.

Early Rose potatoes will be another good crop next spring. Many growers have already ordered their seed for January and February planting. The profits the past season were as high as $340 an acre. Ten times the acreage will be put in the coming season as was planted in 1907. Fall potatoes, or second crop, as they are called, are making a fair crop and will bring moderate returns.

It is entirely too early to forecast the amount of fruit trees and vines that will be planted in this district the coming season, but the aggregate will be enormous. Peaches, plums, pears, cherries, figs, oranges and lemons will be planted largely, and wine grapes will predominate. The table varieties of grapes, principally Thompson Seedless, Malagas and Tokays will be largely planted. The writer believes the table grapes will bring more money than the wine varieties and find a readier market. The Thompson Seedless has brought banner prices as a table grape this season, as have the Tokays. The Malaga is a fine grape, but does not produce as heavily in this vicinity as the other varieties named.

Turlock will have a cannery here by next spring if your correspondent is correctly informed. A local capitalist says he will put a large cannery here and will have it in readiness for business by the time the spring crops are ready. This, with a winery, which is also assured, and another packing plant in contemplation will make this busy little place livelier than ever. Watch the Turlock Irrigation District grow!

An ideal bacon hog should be smooth and even throughout with uniform covering. The back should have an even covering of fat running from three-quarters to one inch in thickness, evenly laid from the crest of the neck to the tail head, and not thickening to a heavy patch behind the shoulders or over the loins. The hams should be fairly heavy in proportion to size and weight and the shoulders light and trim, laid in smoothly with the neck and body. Bone should be of good character with sufficient strength to carry breeding stock to maturity without breaking down of limbs or feet. The bacon hog should be marketed between the weights of 160 and 220 pounds, with 180 pounds as the most desirable weight. The tendency of

CALIFORNIA FARMS AND HOMES

The best land. Mildest climate. No rain from April to December. The finest irrigation system in America. Your land owns the water. Crops never fail. Oranges, Lemons, Alfalfa, Raisins, Grapes, Figs, Sweet Potatoes, Corn, Peanuts; in fact nearly everything that can be grown in the United States is grown here. Farmers make great profits. Many buy and pay for land out of first crop and have money left. They do it, why can't you? You can. Since irrigation, five years, land that sold for $12.50 now sells for $100.00 and still going up. I have big and little farms; improved and unimproved; irrigated and dry land.

I GIVE ALL KINDS OF TERMS

IF YOU WANT TO BUY I CAN SUIT YOU. WRITE NOW.

C. W. MINNIEAR - - - - - - - - - - **Modesto, California**

late has been toward lighter weights than were approved of five years ago.

Puts Farming in Front.

Dr. P. L. Hall, of Lincoln, president of the Nebraska Bankers' Association, puts agriculture in the front as the basis of the wealth in this country, and in his address at the recent annual meeting of the association pointed out the grounds for his faith, saying in part:

"A year ago we appointed a committee on mines and mining industries, and the appointment of this committee was taken as a joke. But I find from the report of this committee there has been produced from the wheat, corn, hay, alfalfa, live stock and miscellaneous mines of Nebraska during the last fiscal year $247,898,482 of products, as against $132,290,097 from the gold, silver, copper and coal mines of the States of Colorado, California, Alaska, Arizona, Michigan and Pennsylvania, or $125,608,385 more from the agricultural mines of Nebraska than from those exclusively mining States."

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TURLOCK, CALIFORNIA

A New Bank *A Growing Bank*

A Prosperous Bank *A Clean Cut Bank*

GIVE US YOUR BUSINESS

Turlock Property . . .

(1) 140 acres, good level land, fenced, $28.00 per acre. In the Turlock irrigation district.
(2) 80 acres, house, barn, fence, 6 miles from thriving town of Turlock. $65.00 per acre.
(3) 1000 acres subdivided into 20 acre lots. Nice, soft, sandy land. $45.00 to $50.00 per acre; very easy terms.
(4) Town lots $75.00 to $200.00. One-acre blocks from $450.00 to $500.00, 2½ acres $1000.00, one block from $20,000.00 High School Building.
(5) A fine improved ranch of 120 acres 3 miles from town; 7-room modern house, tank house, windmill, barn 76x36, tenant house, corrals, orchard of peaches and grapes, alfalfa and a family orchard. $150 per acre, ½ cash, balance to suit purchaser.
(6) 160 acres 8 miles out $45.00 per acre. 20 acres ½ mile out $100.00 per acre.

All the above property in the famous Turlock Irrigation District where the land owns the water. Write or call on

J. K. MILLS, TURLOCK, CALIFORNIA

Write The Denair Mercantile, Land and Development Company, Turlock, Cal.

For Information, Terms and Prices of their land in the Turlock Irrigation District, Stanislaus County

We Sell Only Our Own Lands

Don't...

Go any further. Turlock is the place. Best land, heaviest crops, surest and cheapest water. Will produce anything that can be grown in California For further information, call on or write

I. A. HODGES

TURLOCK,
CALIFORNIA

WE WANT FARMERS!

with $200.00 to $500.00 to buy 20 Acre Farms in this

Turlock Irrigation District

where the crops of the **First Year's Growth** will pay for the land

OVER 1300 Ranches sold within four years. Will guarantee this statement. Write us for information.

CENTRAL CALIFORNIA LAND AGENCY

The Original Colonizers of Turlock Irrigation District

TURLOCK, CAL.

LAND - - - LAND

¶ The finest Irrigated Land in California, in the best Irrigation District in the World, for the least money; good land from $40 to $75 per acre, including water rights, in fact the land owns the water. No water right to buy.

75,000 Acres Sold in Three Years

¶ We have fine land in alfalfa for from $60 to $100 per acre, in quantities to suit. Unimproved land in 20 or 40 acre pieces, on easy terms, for from $30 to $75 per acre. **This Land Raises Six Crops of Alfalfa Per Year.** Settlers are coming every day, so don't delay, but write for what you want today.

MODESTO LAND COMPANY

P. S. Fine, soft, pure water can be had in abundance from a depth of 40 to 60 feet. Absolutely free from malaria, mosquitoes and alkali. Fast becoming a health resort

An Opportunity in Nevada for

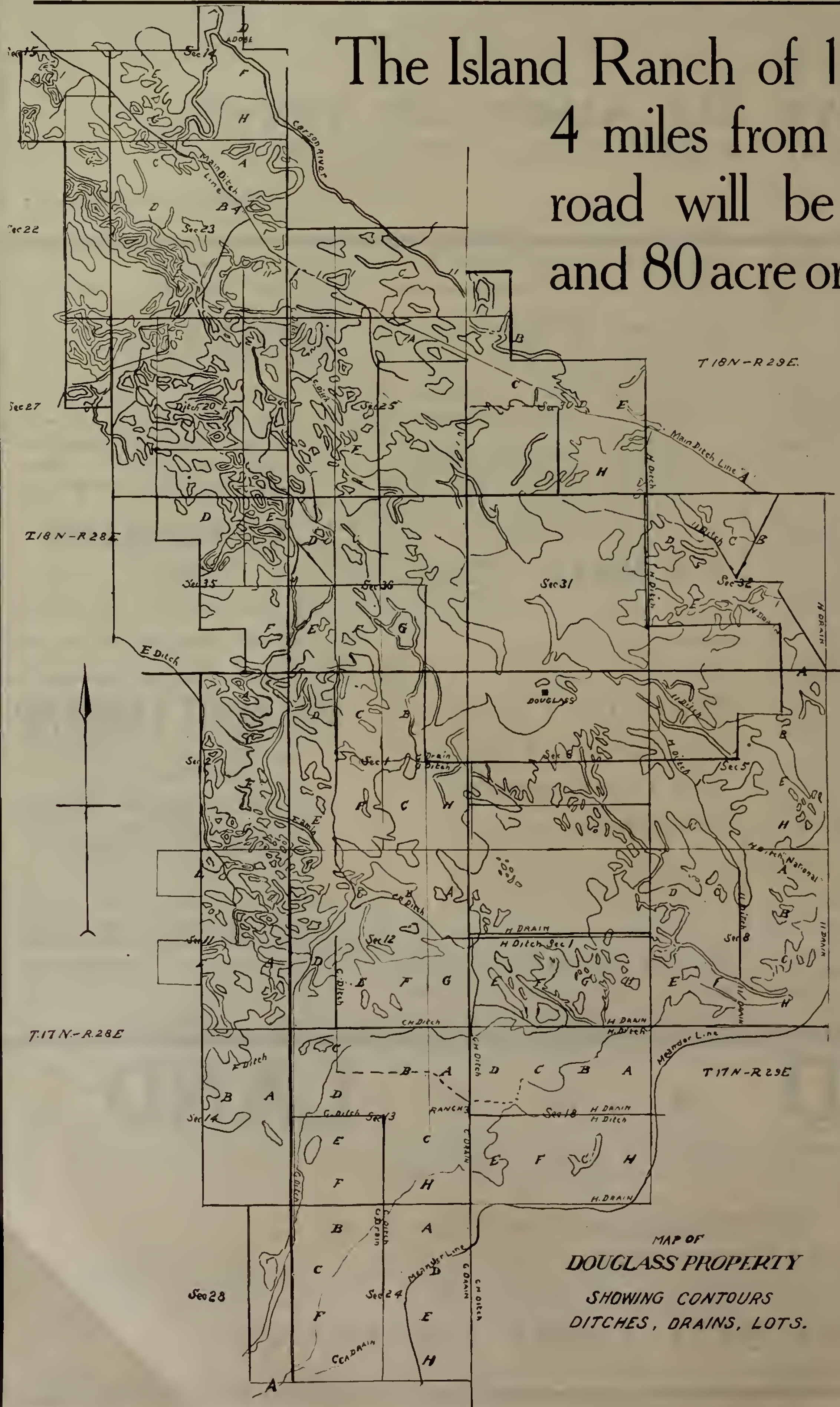
The Island Ranch of 12,000 acres 4 miles from S. P. Railroad will be sold in 40 and 80 acre or larger tracts.

Irrigated by U. S. Government

Carson-Truckee Project

There is not an acre of ground in all this vast area that cannot be irrigated from the Government laterals.

Two branches of the main fork of the Carson River flow through the land.



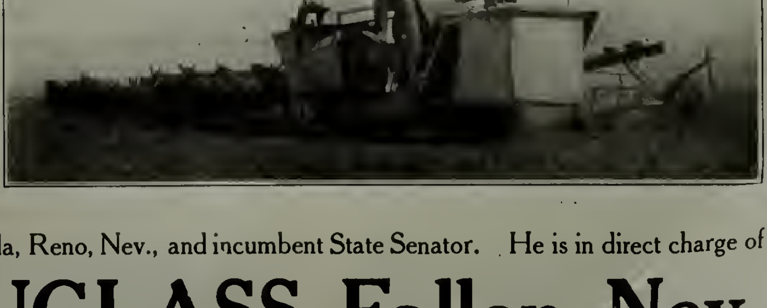
The Homeseeker and Investor

R. L. DOUGLASS, sole owner of the Island Ranch, situated 4 miles from Fallon, Nevada, offers to the homeseeker or investor an opportunity which will never be duplicated in the history of the state. This magnificent domain is the largest tract of irrigated land in the State of Nevada. It is cut by the main canal of the Carson-Truckee U. S. Government project and is supplied by the United States Government in perpetuity with water. The soil is a rich sandy loam with an average depth of six feet and on it can be raised any temperate or semi-tropical product. The soil on this tract is particularly fertile owing to the alluvial deposits from the overflow of the Carson River. Roads cut the ranch in all directions. Schools are but one mile from the tract and the thriving city of Fallon with a population of over 1,200 is but 4 miles distant. This land was taken up in the early 60's and consequently the tract was chosen for its fertility over all other land in the great basin in which it lays, the Carson Sink.

The purchasers of this property have absolute title to the land and do not have to conform to the Homestead laws but can be served with water from the government ditches as though an actual homesteader. There are at present under cultivation 1,000 acres in grain and alfalfa and hay is cut from 3,000 additional acres. **Products** from this district bring exceptional prices owing to the extraordinary demand from the adjacent mining communities. Twice the amount of products raised is shipped into the county and the demand is growing daily. Alfalfa **in the stack** finds a ready market at $11.00 a ton. Barley, wheat and oats sell for $35 to $40 a ton on the ranch, and potatoes at 1¾c to 2c per pound.

Reason for Selling

The owner of this property made an agreement with the U. S. Government allowing the diverting of water from the Carson river into the canal of the Government project and in return was given in perpetuity water sufficient to irrigate 3000 acres. The other 9000 acres must be taken up by others to obtain water, hence the necessity of placing the land on the market. **This land is offered at from $5.00 to $15.00** per acre in 40, 80, 160 or more acre tracts. **Time payments.** This is the lowest valuation for similar land in the United States. The owner, R. L. Douglass, is the founder of the Churchill County Bank, President of Douglass & Jarvis, Bankers, Inc., Fairview, Nev., a director in the Bank of Nevada, Reno, Nev., and incumbent State Senator. He is in direct charge of the property and will answer personally all inquiries. Those interested are requested to write



R. L. DOUGLASS, Fallon, Nev.

The Canadian Pacific's Irrigation System Near Calgary, Alberta, Canada

By J. E. GREEN.

THE area embraced in this, the largest single irrigation system in America, comprises a block of three million acres situated in the Bow River Valley, east of Calgary, Alberta, Canada, along the main line of the Canadian Pacific Railway. The block has a length east and west of 150 miles and an average width north and south of 40 miles. Probably the most striking way of illustrating the magnitude of the area embraced in this irrigation block is to offer some comparative facts. It is larger than the states of Connecticut and Rhode Island combined; it is one-eighth the size of England and Wales; about the same size as the Hawaiian Islands, and twice the size of the island of Porto Rico. The area of land to be placed under irrigation within the block is five times as large as the irrigated area of the state of Utah; greater than the irrigated area in the State of California; equal to the total irrigated area in the state of Colorado; and greater than one-fifth the total irrigated area of the United States. The block is an open prairie plateau, with a general elevation at its western boundary of 3400 feet above sea level, and slopes rapidly to the East until an elevation of 2300 feet is reached at its eastern boundary. The surface is slightly rolling in the western section, but in the eastern section immense areas of almost level prairies are found. The whole area produces naturally and most luxuriantly very nutritious native grasses, and the natural grazing is such as to permit of the grazing at large of horses, cattle and sheep throughout the whole year.

The Soil of the Bow Valley.

The soil is first-class, with a heavy black loam and sub-soil in the western portion, and a lighter, sandy loam with good sub-soil in the more easterly parts. It is virgin soil, never having been taxed or exhausted in any way, and contains incredible possibilities. Unlike some sub-humid counties, southern Alberta is free from cactus, sagebrush and alkali, and settlers find the land ready for the plow, with absolutely no expense for clearing. The following extract from a report by Professor Shaw, editor of the Orange Judd Farmer, considered one of the foremost agricultural experts of America, will be of interest:

"The first foot of soil in western Canada is its greatest natural heritage. It is worth all the mines in the mountains from Alaska to New Mexico, and more than all the forests from the United States boundary to the Arctic Ocean, vast as these are. And next in value to its heritage are the three feet of soil which lies underneath the first. The sub-soil is only secondary in value to the soil, for without a good sub-soil the value of a good surface soil is neutralized in proportion as the sub-soil is inferior. The worth of the soil and sub-soil can not be measured in acres. The measure of its value is the amount of nitrogen, phosphoric acid and potash which it contains—in other words, its producing power. Viewed from this standpoint, these lands are a heritage of untold value. One acre of average soil in the Canadian Northwest is worth more than twenty acres of average soil along the Atlantic seaboard. The man who tills the former can secure twenty successive crops without much diminution in the yields, whereas the person who tills the latter must pay the vendor of fertilizers half as much for materials to fertilize an acre as would buy the same in the Canadian Northwest, in order to grow a single remunerative crop."

The Irrigation Project.

It has already been explained that the vast area of three million acres included in this irrigation block lies along the main line of the railway for 150 miles east of Calgary. The problem which confronted the company was how to colonize this land and make it traffic-producing.

Preliminary surveys proved that about one-half of the block—1,500,000 acres—could be irrigated, and it was in 1904 that canal construction was commenced. The water for the irrigation of the western portion is diverted from the Bow River at a point about two miles below the city of Calgary. From there it is carried south and east through a main canal seventeen miles in length, which is sixty feet wide at the bottom, 120 feet in width at the water line, and carries water to a depth of ten feet.

In the western section of the irrigation block there will be of main canals 17 miles: secondary canals, 150 miles; distributing ditches, 800 miles. Total, 967 miles.

In addition there will be several hundred miles of small distributing ditches constructed by the farmers, and to distribute water over their farms. In completing the work of the western section of the block the following amount of earth will be moved: Main canal, 2,500,000 cubic yards; secondary canals, 5,000,000 cubic yards; distributing ditches, 750,000 cubic yards, making a total of 8,250,000 cubic yards!

Surveys have proven that about the same percentage of waterway and excavation will apply to the central and eastern sections, and the completed project will therefore stand about as follows: Main and secondary canals and distributing ditches, 2900 miles; amount of material moved in completing the project, 24,750,000 cubic yards!

The ultimate expenditure on this great undertaking is estimated at about $5,000,000, which, taken in conjunction with the area of land in the block that it is proposed to irrigate, justifies the title given this scheme, "America's greatest irrigation project."

The Canadian Irrigation Law.

The permanency of all irrigation development is dependent upon the law relating to the use of water. To the owner of an irrigated farm the question of the *title* to the water to irrigate his crops and certainty of its *never-failing* supply are of as much importance as is the title to his land.

In many states thousands of acres have been sold for irrigation that have never been supplied with a drop of water, and the only recourse of the purchaser was a long and expensive lawsuit. *In fact, he bought a lawsuit instead of an irrigated farm.*

It is claimed by competent authorities that as much money has been spent in many parts of the United States on litigation regarding water titles as has been expended in irrigation development.

In the United States a different law regarding the use of water is found in almost every state where irrigation is used to produce crops, and, with the possible exceptions of Wyoming and Nebraska, none of these laws provide for that care in the appropriation and use of water necessary to provide permanency of title, supply and immunity from vexatious lawsuits.

In Canada the law relating to the use of water for irrigation has been framed to prevent the disputes and losses experienced by irrigators south of the international boundary, and has been declared by resolution of the American Irrigation Congress to be far in advance of any similar laws in the United States. The irrigation branch of the Department of Agriculture at Washington has issued a special bulletin calling attention to the meritorious features of the Canadian law and setting it up as a pattern which should be adopted by states within which irrigation is practiced.

The Canadian law is based upon the following broad principles:

(a) That all water is the property of the government, and can only be acquired for irrigation by making proper application to the government and obtaining authority to divert it, and that any person diverting it without first obtaining such authority shall be subject to a heavy penalty.

(b) That applicants for the right to construct irrigation works must complete them within a stated time, and to the satisfaction of inspecting government engineers; that they must use the water for irrigation and *sell the same at rates approved by the government.*

(c) That no stream can be burdened with more records (permits) for water than there is water to supply the land to be irrigated; this being prevented by refusal of the government to grant any further records after the debit side of the ledger account opened by them for each stream shows that the credit of water supply, as indicated by yearly government gaugings, has been exhausted by records granted.

(d) That the duty of water, or the amount to be supplied for any given area (at present one cubic foot per second for each 150 acres), and the irrigation season (May 1st to November 1st), during which period such water must be supplied, shall be fixed by the government and not left to the power of any irrigation company or person selling water for irrigation to change.

(e) That all agreements for the supply of water for irrigation must be registered with the government, so that they may have notice of the contracts entered into by irrigation companies.

(f) That any disputes regarding the division or distribution of water are settled by a government official without the necessity of any appeal to the courts or bill of costs to parties making the complaint.

(g) That parties complying with the provisions of the law, and being granted right to divert water, obtain a patent for it direct from the Government, which they can carry in their pocket, if they wish, as prima facie evidence of their title and an assurance that any attempt to interfere with such title will be prevented by government officials without cost to owners of the water patent.

The best proof of the fairness and stability of the Canadian law relating to irrigation is the statement that, although irrigation has been practiced

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Only An Hour's Ride From Los Angeles by Trolley

THE CYNTHIA APARTMENTS

THE CYNTHIA faces the great Pacific, but a stone's throw from a shelving beach where bathers disport the year round. From its broad verandas is seen the castellated outline of Famed Catalina, rising mist-shrouded from the waves, to the left loom the Sierra Madre mountains, to the right stretches the sun-lit California landscape. The Cynthia is a newly built, fire proof apartment house where you can combine the luxury of hotel life with the comforts and economies of home. The furnishings are elegant, each apartment being steam heated and equipped with every modern convenience. The basement contains the most finely appointed Turkish Bath Rooms on the Pacific Coast. The Cynthia has twenty-six four room apartments, 5 three room apartments, 5 two room apartments and ten single rooms.

Let the Cynthia be Home to You this Winter.

WRITE FOR RATES TO

P. O. Box 214 **THE CYNTHIA** **Long Beach, Calif.**

under it for ten years, and there are today in southern Alberta 800 miles of canals and ditches carrying water for irrigation, not a lawsuit involving water rights has occurred during that period.

The canal constructed by the Canadian Pacific Railway Company to supply water to the lands now offered for sale has an absolute title under the Canadian law to 2000 cubic feet of water per second from the Bow River, and that river at the point of intake for the canal has never shown, at its lowest stage, since government gaugings were commenced some years ago, a smaller flow than 3000 cubic feet per second. *During the irrigation season the flow usually averages about 6000 cubic feet per second.*

The source and volume of the supply are therefore assured, *the title to the water* is as *good* as *the title to the land*, and in addition the purchaser of an irrigated farm gets the guarantee of the Canadian Pacific Railway Company that they will supply him with water for all time.

This is the first time on the continent that water has been supplied for irrigation under such an absolute title and with such a guarantee as to its supply by the company selling it. The purchasers of irrigated farms in this block need have no fear of encountering the disappointments as to water supply that have so frequently been experienced throughout the United States.

Special Features of the Project.

The Canadian Pacific Railway Company's irrigation project differs from other irrigation undertakings, on this continent in certain main features that are deserving of special mention.

In the first place the project has been undertaken for the definite purpose of transforming a large area at present unsettled and non-traffic-producing into a closely settled and prosperous farming community, with the attendant traffic receipts that always result from such districts. For this reason the scheme has not been undertaken to make money from the irrigation project itself, but as a colonization and futue traffic-producing investment.

Following this basis, the company has departed from the usual practice on this continent of building only the main and secondary canals to bring the water to the area to be irrigated, then leaving it to the purchasers of the irrigated lands to get together and build the distributing ditches to deliver the water to the individual farms. In this undertaking not only the main and secondary canals are built, but also the vast system of distributing ditches, so as to provide for the delivery of the water at some point on each quarter section of irrigable land offered for sale. The purchaser of such land can see on the map from which he buys his land exactly where the water is to be delivered to him, and need be at no bother as to securing the co-operation of his neighbors in building and maintaining the ditches to bring the water to his farm. This is a departure which appeals strongly to settlers from irrigation districts who are acquainted with the trouble and annoyance met with where the usual practice is followed.

Having undertaken to deliver the water at some point on the boundary of each quarter section of irrigable land sold, and selling such land from a map which shows from detailed survey exactly how many acres of such quarter section can be irrigated with water supplied at that point, the company goes a step further and provides for a ten per cent reduction in such irrigable area in the annual charge for water, so that portions of the irrigable area used for buildings, roads, etc., are not charged for water which can not be used.

The foregoing special features are unique in connection with irrigation undertakings on this continent.

The Combination Farm.

Owing to the fact that this irrigation block contains about equal proportions of irrigable and non-irrigable land, it offers to the purchaser an opportunity to engage in mixed farming under almost ideal conditions. Here can be secured in the same quarter section irrigable and non-irrigable land, thus giving the settler the best possible combination for a foundation for mixed farming operations.

The irrigated portions of the land will raise all kinds of grain and root crops and a sufficient supply of fodder for winter feeding. The non-irrigated sections will grow winter wheat, or furnish the finest pasture for live stock to be found in the world.

The native grasses on the plains of Alberta are rich in fattening properties, so much so, in fact, that Alberta beef, shipped direct from the range, has come to be considered as fine as the corn-fed beef of the states. Combination farms in this block can justly be regarded as the best agricultural proposition on the American continent.

Cereal Growing Under Irrigation.

Skeptics have claimed that the various cereals can not be successfully produced under irrigation; that the cost of paying for water rental and supplying the water is too great, having in view the comparatively low value of such crops. It is of interest to note, however, that in the state of Colorado the water rental is twice as great as is charged in connection with the Canadian Pacific Railway Company's project in Alberta, which is 50 cents per acre per annum (an extremely low maintenance charge), yet one-sixth of the whole irrigated area of the United States is devoted to the production of wheat, oats and barley. In the state of Colorado alone 248,000 acres of wheat are grown annually under irrigation, over 100,000 acres of oats, and some 20,000 acres of barley. The land in Colorado is worth from three to six times what the Canadian Pacific land is offered for, and as the soil of southern Alberta is vastly richer than that of the irrigated sections of Colorado no difficulty should be experienced by Alberta farmers in raising profitable crops of wheat, oats and barley under irrigation. The Alberta-Pacific Elevator Company, doing business in the province of Alberta, has a standing offer of ten cents per bushel in excess of the market price for all malting barley grown in this province, the maltsters of Europe claiming that Alberta barley is equal, if not superior, to the famous Gallatin Valley barley grown in Montana.

Southern Alberta is the home of the winter wheat, and yields of 50 to 60 bushels per acre are being obtained under irrigation. Yields of 35 to 40 bushels on dry land are the average this year. Oats are yielding 60 to 100 bushels, and barley 35 to 45 bushels. Alfalfa grows most luxuriantly, and sugar beets excel. Flax is also proving to be very profitable. Live stock of all kinds, on account of the open winters, are raised in great numbers and are sold at most satisfactory prices in the local and outside markets, where the demand far exceeds the supply.

Dairying and Poultry Raising.

The province of Alberta operates 14 creameries under government control. The average net returns for the output in 1906 of something over four million pounds of butter was an average of a trifle over 21 cents net to the farmer. Not enough attention is given to the business of raising poultry. Last year the jobbers of the city of Calgary imported over $400,000 worth alone of eggs and dressed poultry to supply the local demand.

Climate of Southern Alberta.

The moderately high altitude, the clear, dry atmosphere and the abundance of sunshiny days tend to make southern Alberta one of the most healthful countries in the world. There is an entire absence of malaria, with no diseases peculiar to the country. In fact, this section has a continental reputation as a sanitarium particularly for people with a tendency to pulmonary and catarrhal troubles, and many, discouraged of ever again being blessed with good health, have found it in southern Alberta.

The winter in southern Alberta is a season of bright, cloudless days, with infrequent and scanty snowfalls, broken by frequent and prolonged periods of warm weather, heralded by the warm Chinook winds from the south. The effect of this wind in winter may be described as little short of miraculous in its clearing away of the snow, always scanty in amount, with amazing rapidity.

Calgary.

Calgary is a city of 22,000 people, the largest city and principal distributing point between Winnipeg and Vancouver. There are 12 banks, 10 churches, and branches of over 90 wholesale houses in the city. The schools of Calgary are noted for their excellency, there being a Normal School, two colleges, a convent and a High School, and many grammar schools.

This is the social condition existing in the irrigated block of the Canadian Pacific Railway Company's irrigation system, which is as good as the best, and it can be truthfully stated that this district will be the future home of the most closely settled mixed-farming, stock-raising and dairying community in western Canada.

John Harnan's Nevada Mines.

While Nevada has vast possibilities for agricultural development by means of irrigation projects, and agriculture will eventually be her leading industry, her present prosperity is largely due to her mineral wealth. That Nevada has great mineral wealth can be conservatively stated in spite of adverse reports that are now being circulated. It is true that there has been a great deal of wildcatting and that this wildcatting has been made possible by greatly exaggerated reports that have excited people all over the country. On the other hand it is also true that a great deal of legitimate mining has been done by conservative and experienced mining men who have, by their extensive investments, shown their confidence in Nevada's mineral wealth, and by systematic development, have proven their confidence not misplaced.

Prominent among such mining men is John Harnan, widely known in connection with the famous Portland mine of Cripple Creek, Colorado. He came to Nevada when the mining excitement was at its height, but he was not carried away by it. Investigations quietly but thoroughly made, convinced him that Nevada was a good field for investment and today he owns valuable properties in many of the leading camps of the state.

In Fairview he owns the Fairview Cyclone, an extensive property with splendid showings, that is rapidly being developed into a producer that bids fair to rival the Nevada Hills of that district. In Seven Troughs he is part owner in the Mazuma Hills which is conceded to be the richest mine in the district and probably one of the richest in the

IRRIGATED LANDS IN CALIFORNIA

Listings from SUNNY STANISLAUS, the Gateway County of the Great San Joaquin Valley, where the Land Owns Inalienably the Greatest Irrigation System, Water and Canals Alike, in America. THE MECCA OF HOME SEEKERS.

IMPROVED FRUIT LAND.

9 18-100 Acres. 5½ miles from Oakdale. Price $1200; $600 cash, bal. 3 annual payments, 7 per cent interest.

Oakdale is a railroad town of about 2000 population. It is a good business town with a beautiful and productive surrounding country. Improvements consist of 2-room frame house, barn 20x24, 10-ton capacity, blacksmith shop and necessary outbuildings, 40-foot well, with pump. Irrigating ditches are constructed, the cost of water being $2.00 per acre per year. Soil is a deep sandy loam and will raise fruit, berries, vegetables or alfalfa. The land is all level. This place is located in the Orange Blossom Colony. 1s 895

$3000—49 acres. Sandy loam. 12 acres alfalfa. 1000 2-year-old vines. 200 young fruit trees. Abundance of berries of all kinds. $50 worth of poultry goes with the place. Good house of 5 rooms; small barn. Place fenced and cross fenced. Terms ½ cash, balance to suit. Interest 8 per cent. 2 s 3

IMPROVED ALFALFA AND FRUIT LAND.

40 Acres, 1½ miles from Denair, Santa Fe Railroad. Price $6000. ½ cash, balance to suit at 8 per cent.

All level soil, sandy loam, under Turlock Irrigation System. Improvements consist of 1-story frame building of 4 rooms, papered inside and rustic outside. Barn 20x40, outbuildings, windmill, well and tank. All the land is under cultivation being planted to annual crops with the exception of about 2 acres in family orchard. This is a fine new place. It is on the county road only 1½ miles from Denair, a thriving little town on the Santa Fe railroad about 4½ miles from Turlock. Alfalfa does exceptionally well here, as do trees, vines vegetables and berries. The place will support 40 head of dairy cows the year around. Within 2 years Denair will have a population of 1500. 2 s 4

$3000—40 acres, about 5½ miles northwest of Turlock. All level land. Good 4-room house, barn and windmill, 22 acres in alfalfa, 3 years old. A family orchard of different varieties of fruit, 18 acres improved. Alfalfa all fenced. Terms ½ cash, balance to suit. 2 s 2

IMP. ALFALFA AND FRUIT LAND.

55 acres, 4 miles from Turlock. Price $6050. $3500 cash, balance 3 years at 8 per cent.

All level soil, a deep sandy loam, under the Turlock Irigation System. One-story 3-room house with large veranda. New barn, 38x40, windmill and tank. Well of soft pure water, 35 feet deep and cased in iron. All the land is under cultivation and all irrigation ditches are constructed. Cost of water [illegible]5c per acre. Fenced and cross fenced by barb wire. 20 acres planted to alfalfa, 12 acres vines, 3 acres in 80 varieties of fruit trees, balance planted to annual crops. It is situated in the best sweet potato, grape and berry belts in the valley. It is well subirrigated and crops can be raised at a minimum cost. 2 s 5

IMPROVED COUNTRY HOME.

At Oakdale. Price $1600, ½ cash, balance on terms to suit, 7 per cent interest. 9 lots

This property consists of lots 24 to 32, inclusive, in Block 1, together with house of 5 rooms, bath and pantry, well windmill, tank and woodshed. Fine family orchard, under irrigation. Plenty of land to raise berries and vegetables, with run for a large number of chickens and cow. 1 s 896

TEHAMA COUNTY, Where Irrigated Land Paid this Season as High as $750 per Acre Net Profit

No. T 1. IMPROVED FRUIT RANCH. $4500

30 acres all bearing orchard; 6 room dwelling, good barn costing $350; fruit house, cutting shed, and other necessary outbuildings; 6 miners' inches of water constant flow, which is sufficient to irrigate the entire tract. All ditches are in good condition. The orchard consists of 2000 French Prune trees from 6 to 9 years old; 400 Bartlett Pears, 8 years old; 750 Peach trees, 6 years old; 20 Apple trees of five varieties, for home use, also number of grape vines which furnish more than enough grapes and raisins for home consumption. Roses and a large variety of other flowers are growing about the dwelling in profusion. The property is equipped with all the necessary appliances for hauling and caring for the coming crop, such as 2600 trays, 140 lug boxes, trucks, track, dipping kettles and baskets, sulphur houses, etc. Eight miles from Red Bluff.

---

160 ACRES of as fertile land as can be found in the Sacramento Valley located in one of the best fruit and garden districts in Tehama County. One hundred and forty acres in full bearing orchard. Peaches, Prunes and Almonds. All under irrigation. This place has its own water rights and ditches which go with the place; 2½ miles to town and railroad shipping point. All necessary appliances for handling crops. Price, $18,000. Time on part if desired. No. 879.

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114 ACRES two miles from the town of Vina. This is the very best Fruit and Alfalfa or Garden land. Twenty acres of bearing orchard, mostly peaches. All under irrigation with water right and ditches complete. Price, $13,110. Easy terms of payments. No. 880.

140 ACRES of as fine land as can be found in the Sacramento Valley all under a system of irrigation. Permanent water rights of 500 inches. Ditches and all appliances for handling crops go with the place. About 100 acres of fruit, mostly peaches in bearing. The balance of the land is all ready to seed to Alfalfa or plant to fruit or anything a person desires. Price, $60 per acre. Time on part if desired. 876

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276 ACRES of A1 land all in bearing orchard, mostly peaches. Permanent water right, ditches, etc. Fruit trays, boxes, etc., sufficient for handling the crops. A portion of this orchard is old trees that should come out in the near future and be replaced by new ones or the land put in alfalfa or anything that a person might wish to plant. Such land as this commands a price of $100 per acre all through the Sacramento and that, too, without a water right. Price, $18,000. Easy terms of payment. This land is located on Main County road 2 miles from Vina, Tehama County, Cal. No. 877.

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80 ACRES of number one land with permanent water right of 500 miners inches, ditches and headgates built. Sixty acres of this tract is in orchard mostly peaches, 40 acres of this orchard are young trees just come in bearing 2½ miles from good town and shipping point. All necessary appliances for handling crops. Good roads and good schools, etc. Price, $9.200. Easy terms of payment. No. 878.

YOLO COUNTY., the Home of the State Farm---Nuff Sed

40 Acres of Choice Cultivated Garden Land—An Income Property.

Price, $5000. Cash, $3800. Balance at 6 per cent.

Located four miles from Woodland, the County Seat of Yolo County, with a population of 5000, with banks, stores, churches, schools and P. O. rural delivery. There is a bored well 30 feet deep, of pure soft water.

The entire 40 acres are irrigated and the ditches are all constructed. The cost of water is about $1.00 per acre per year. Soil is a deep sandy loam, about 30 feet in depth. All the land is under cultivation; 32 acres being planted to garden truck, 8 acres in Alfalfa and family orchard; the trees being ten years of age. This property is all level and is fenced and cross-fenced. An extra choice piece of garden land, at an exceptionally low figure. 873 Y 2.

Yolo Co. DAIRY AND VINEYARD. 1 Y 902

4 Miles from Woodland. 20 Acres. Price, $5500 Cash.

The improvements consist of a one story frame house of 3 hard finished rooms, about 5 years old and in good condition, with a large screened veranda. A barn 80x60 of 100 tons capacity. Chicken houses and outbuildings. A 70-foot cased well of soft water. The entire 20 acres are under irrigation, the ditches constructed, and cost of water is about $1.00 per acre, per year. Soil is a sandy loam of good depth, that will raise any kind of a crop. All the land is level and is fenced by barb wire. The land under cultivation is planted as follows, 12 acres alfalfa, 1 acre 2-year-old almond trees and 3 acres in Sultana grapes, 5 years of age. This property is situated in Willow Oak Park and is a splendid piece of land. Three great oak trees and a number of walnut trees furnish abundance of shade. This is an attractive small home with an income property.

UNIMP. DAIRY AND GARDEN LAND.

30 Acres. Price $4350.

4 miles from Woodland, $2350 cash, balance on mortgage, 7 per cent.

Woodland, the county seat of Yolo county, is a thriving business town of 5000 population This is an exceptionally fine piece of land, the soil being a sandy loam, 10 feet in depth. All irrigation ditches are constructed. Price of water $1.00 per acre per year, 22 acres planted to alfalfa, balance in garden truck. The entire 30 acres are fenced and cross-fenced with good wire fencing. All level. This land is A1 and will grow any kind of a crop. Owner is interested heavily in adjoining lands and in order to raise money has offered this at the very low figure of $125.00 per acre. 1 y 894

Yolo Co. DAIRY RANCH $7000 Cash.

2 miles from Woodland, 40 acres. Bank will loan $3500.

Woodland, the county seat of Yolo county, is a thriving business town of 5000 population.

The improvements on this property consist of a one-story 5-room finished house, a barn 52x52 of 42 tons capacity with 18 standing stalls, outbuildings and three chicken houses. There is a 31-foot cased well. Of the 40 acres nearly all is planted to alfalfa, the soil being a deep rich sediment that will raise fruit or garden truck. The land is irrigated, the ditch being on the property. Cost of water is one dollar per acre per year. The land is all level and is fenced with wire and board rail. This is an exceptionally fine dairy ranch. There is a home market for any kind of crop at Woodland. 2y890

ARTHUR H. JORDAN, INC.,

CALIFORNIA LANDS EXCLUSIVELY
Principal Office, 773 Market Street
SAN FRANCISCO CALIFORNIA

state. In Washoe County two important districts owe their development largely to him. One of these is New Leadville, where he owns a high-grade lead-silver mine which is now a producer and a shipper. The other is Cottonwood where a great copper deposit is being developed by the Fleetwood Copper Company, of which he is the head. Besides all these he has interests in Manhattan, a district in whose future he has great confidence.

Harnan's method of mining is an exemplary one. While many, taking advantage of the excitement, sold a great deal of stock but did very little actual mining, and on the whole did the state more harm than good; he, either alone or with associates like himself, took over good prospects and developed them into mines without selling a share of stock.

The method of raising money for the development of a prospect by selling stock in a corporation is all right in itself if the prospect is a good one. But this method has been very extensively used for the purpose of raising money on prospects that had no merit, and the money thus raised has, in many instances, gone not into the ground, but into the pocket of the promoter. Nevada has suffered much on account of the extensive mining on paper that has been done by wildcatters and unprincipled speculators.

In spite of the handicap that has been placed on the development of her mining interests by this class of operators, we confidently predict that Nevada will rapidly assume her proper place among the greatest mineral producing sections of the world and in so doing our confidence is principally based on two things. One is our knowledge of the extent and richness of the state's mineralization. The other is the fact that we have in the state many men of John Harnan's stamp to carry on the development of her vast resources along legitimate and systematic lines.

Douglass Property in Nevada.

A splendid opportunity is offered the home-seeker and investor by the selling off of the Douglass property, or what is known as the island Ranch, four miles from Fallon, Nevada, owned by R. L. Douglass. There are 12,000 acres, cut by the Truckee-Carson canal, the largest irrigated tract in that State. It is supplied by the United States Government with water in perpetuity. The soil is particularly fertile. The terms of the Homestead laws do not have to be complied with. The land is offered at from $5 to $15 an acre in farms of 40, 80, 160 or more acres. Full details are given in the advertisement on pages 212-213.

Industrial Educational Conditions Abroad.

The committee which was sent by the Massachusetts Commission on Industrial Education to investigate certain industrial educational conditions in some of the most important European countries, and which consisted of Charles H. Winslow, a member of the commission, and Charles H. Morse, the secretary and executive officer, has brought back most interesting and valuable reports on what it has found by observation and personal inquiry, says American Industries.

The information gathered includes not only an account of the various schools at present in operation, both as regards the courses of study and the administration and financing, but embraces as well the views of some of the foremost authorities on industrial education, together with the attitude of both employers and employees toward the instruction provided by numerous schools operated by means of state, local and municipal subsidies, and by private funds.

A very important element in this investigation was the obtaining at first hand of the opinions of those qualified to judge concerning the effects of the plans at present in operation for giving industrial education to the youth of both sexes. Conditions in England, for instance, are quite interesting and instructive.

While there are national subsidies, and consequently national control of industrial education, yet the local conditions vary enormously, and no one place will stand as a representative example of the whole country, or even of any extended section of it. There can be no doubt, however, as to the national and local awakening to the need of industrial education; but the existing social conditions which have to be met, and which are not only peculiar to England but to the separate localities, will make progress slow and experimental. It seems to be a fact, however, that in general the industrial education movement is most active and farthest advanced in London.

In Liverpool, with its great technical school, which cost upwards of half a million dollars, the conditions are most interesting. There are 1,500 pupils in the evening classes, but, except for some special summer classes of adults, this finely constructed and well-equipped building is unoccupied during the daytime, largely, perhaps, because it is feared that daytime industrial instructions would interfere with the regular public schools by permaturely attracting pupils from them. As a rule, pupils do not apply for instruction in this school unless they are working, or have worked, in the trade that they wish to study, the evening pupils being employed during the daytime in the occupation in which they seek instruction.

Wonderful Wheat.

A. Adams, of Julietta, Idaho, three years ago brought from British Columbia one head of wheat, which he planted. Two years ago he had one quart of this grain. This he again planted and last year had secured enough to plant thinly over 30 acres. Nearly half of this was winter killed, but from the 30-acre tract he has this fall reaped an average of 90 bushels to the acre, or 2700 bushels for the entire tract.

In reply to a letter asking for an affidavit relative to this yield, Mr. Adams writes:

"In relation to your inquiry, I will say that I do not want any notices of my wheat to be published this year. When I get enough wheat to suit me, that is, next year's crop, I will give a history of my wheat to the public. I shall advertise it all over the United States.

"For your personal information I will say that it actually yielded more than 100 bushels to the acre for the ground that was not killed out."

Irrigating Large Ranch by Pumping.

With a rich soil, 300 feet in depth in some places, the San Joaquin Valley, in California, can produce crops that would feed a nation. Under the valley is a great stratum of water, almost an underground lake, fed by the rain and snow that falls upon the Sierra. It has been found that this water can be applied to lands at great profit by pumping. All through this valley are windmills and gasoline and steam pumping plants that are lifting water for orchards, gardens and alfalfa fields. Cheap fuel oil is adding a great impetus to this method of irrigation. Crude petroleum is as low as 20 cents a barrel sometimes in the Bakersfield region. Gasoline engines with crude oil generators are being used. A. L. Sayre is irrigating a large part of his ranch of 804 acres at Madera, Fresno County, by pumping. He dug a pit twenty-five by seventy-five feet down to within two feet of the water, and in this sank two wells, twenty feet apart. His plant consists of a ten-inch centrifugal pump, lifting 4000 to 4500 gallons a minute, and a sixty-horsepower engine, which stands on the bank of the pit. This runs night and day at a cost of $9 for twenty-four hours. From eight to twenty acres of land can be flooded in that time, according to the variety of the soil. The water supply seems inexhaustible. The stratum from which it is pumped is 110 feet below the engine site. The entire ranch could be irrigated with the plant. Alfalfa, grapes and grain are the principal crops.

Growing the Easter Lily.

No bulb collection is complete without a few lilies. The Bermaunda is the favorite for spring blooming. It should be ready for Easter and if properly managed does not disappoint the gardener. October is the time for beginning on the giant lily. It is the season for potting and laying plans. To be successful one must have a dark cellar or spot where the bulbs may be started. When that is secured then the next thing is the box, or pot, in which the bulbs are to be planted. It should have plenty of rich earth and be large enough to supply the plant with food and prevent falling over when it gets top heavy.

The large bulbs are always the most satisfactory, an exchange says. It matters little about the difference in the original price. You will not notice the loss of ten or fifteen cents on a bulb next spring when the flowers come out. Get the large specimens if possible. Set them in pots six to eight inches across. Then put them away in the cellar or dark place for two months. By that time they will be ready to bring to the light. Then keep them watered and in a moderate temperature so they will not stop growing. A strong bulb will give four to six nice buds that will come out as early or late as you wish by simply keeping them in the dark or light to hasten or defer growth. Too much water is not advisable, as it causes the bulb to decay.

Lily bulbs are liable to be bruised in transmission, and, like the onion, will soon show signs of wasting away. They should not be kept out of the soil any longer than it takes to get the earth arranged and the pots in condition. The small ones are frequently soft and indicate that they are decaying. If put in the earth and kept moderately moist they will come forth all right and give good flowers. It is always best to get the large, solid bulbs and take few chances on having flowers in the spring. Lily growing is profitable if one lives near a large city and becomes acquainted with the habits of the flowers so as to have them come on the market at the proper time.

Baby's Proper Clothing.

Baby is too often smothered in flannels and kept in a continual perspiration by an over amount of clothing during the long clothes period, says the Housekeeper. It is thus weakened and its resistance to the effects of changing temperatures destroyed. Often this over-heating and the friction of the flannel results in a heat rash which tortures

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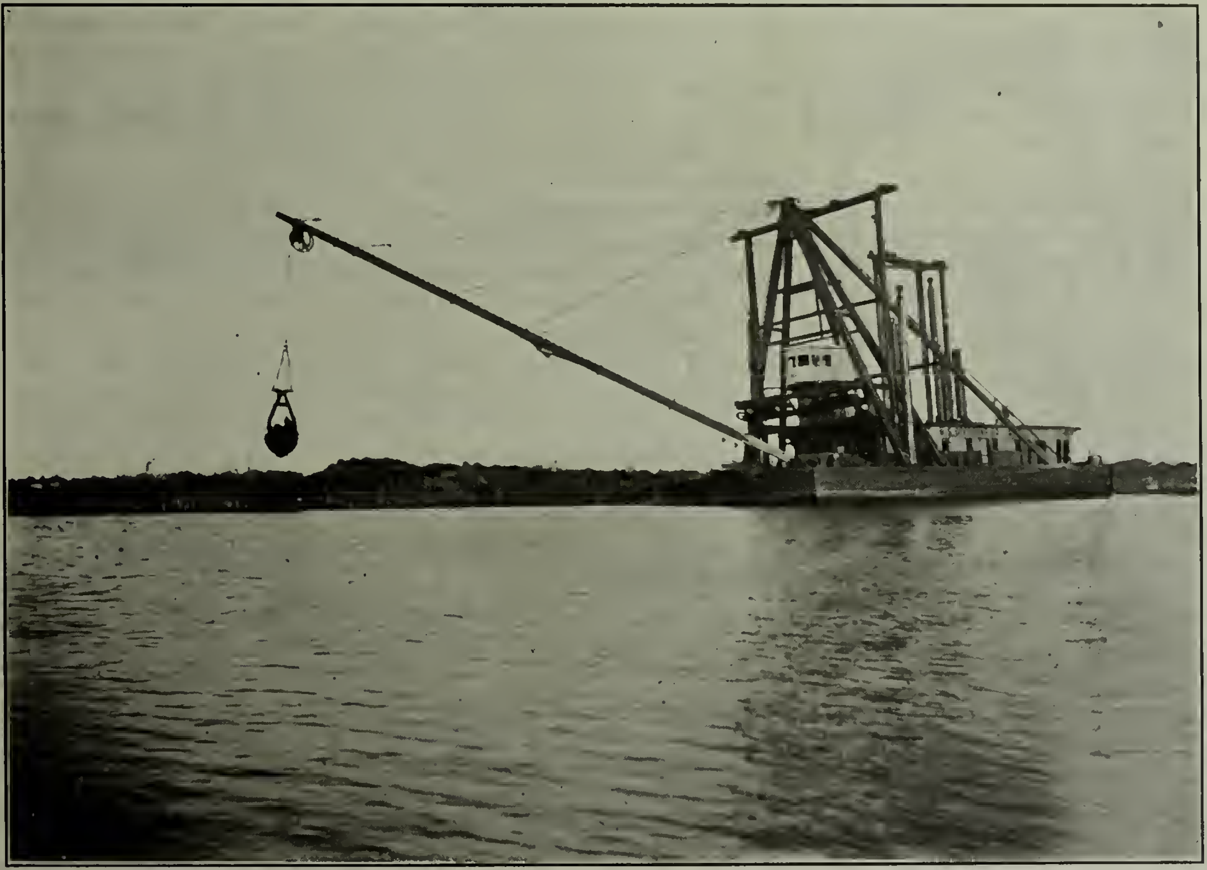

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"YOLO"	" 145 "	" 4½	" " " "
"CALEDONIAN"	" 140 "	" 4½	" " " "
"RYER ISLAND"	" 145 "	" 4	" " " "
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"STATEN ISLAND"	" 140 "	" 3½	" " " "
"HOLLENBECK"	" 140 "	" 3½	" " " "

ALSO MANY SMALLER DREDGERS TOO NUMEROUS TO MENTION

WE HAVE BUILT ALL THE LARGEST DREDGERS USED IN CALIFORNIA

the little patient and makes it really ill because it can not get proper sleep. It loses its appetite and becomes thin of flesh and succumbs easily to an acute attack of some infectious disease, or fails to have the needed strength to carry it through teething or the summer heat.

Often, too, the opposite extreme is taken in dressing during the short clothes period. It is painful to see on the streets in cold, damp weather the blue, cold legs and arms of the scantily clad little ones of even the well-to-do. Consistency is a rare virtue with average humanity. As the winter is the season when the babies are most likely to suffer from being suffocated, and as at present the infants of all classes are in danger from the practice of its different forms, it is an important matter to know how to avoid it. If all mothers and those having the care of small children only understood that fresh air is the breath of life to the human body, and that a few minutes is all the body can endure of complete air deprivation, they would never risk the danger of covering up the baby's face even to cross the street. If they understood that it is infection and not draughts which cause colds, pneumonia and other infectious disorders, they would not dare cover the child's head in bed or keep it in a close, illy ventilated room. And there would never be another infant die from either complete or partial suffocation.

Water Users' Association.

The following Water Users' Associations have been formed to assist the Reclamation Service:

Belle Fourche Valley, Belle Fourche, South Dakota.
Buford-Trenton, Buford, North Dakota.
Elephant Butte, Las Cruces, New Mexico.
El Paso Valley, El Paso, Texas.
Finney County, Garden City, Kansas.
Klamath, Klamath Falls, Oregon.
Lower Milk River Valley, Malta, Montana.
Lower Yellowstone, Sydney, Montana.
North Platte Valley, Scotts Bluff, Nebraska.
Okanogan, Alma, Wash.
Payette-Boise, Caldwell, Idaho.
Pecos, Carlsbad, New Mexico.
Rio Hondo, Roswell, New Mexico.
Salt River Valley, Phoenix, Arizona.
Strawberry Valley, Spanish Fork, Utah.
Tieton, North Yakima, Washington.
Umatilla, Hermiston, Oregon.
Uncompahgre, Montrose, Colorado.
Williston, Williston, North Dakota.
Yuma County, Yuma, Arizona.
Orland, Orland, California.

Watering Stock.

What is meant by the term "watered stock"? asks a reader of Housekeeper.

Stocks of railroads and other corporations are said to be "watered," is the reply, when they are issued in an amount exceeding the market value of the road or other property which they represent. That is, suppose a railroad was worth $10,000,000, and its owners put its stock on the market to an amount aggregating $20,000,000, that would be "watering" it. The method is, no doubt, taken from the method by which milkmen are supposed to increase their profits.

Wooden Stave Water Pipe.

A great industry in the Western States in connection with irrigation and power projects is the manufacture of wooden stave water pipe, carried on by the Washington Pipe and Foundry Company of Tacoma, Wash. It furnishes millions of feet of pipe annually all over the Union. This is used also by waterworks systems in cities and towns and in reservoirs and mines. This wooden stave pipe is better than any other manufactured, excepting cast iron, and is inexpensive. The Tacoma company can make a machine-banded pipe that will withstand a pressure of 285 pounds.

Free Sample of Congo.

If you are planning to buy any roofing this spring do not neglect to get a free sample of Congo roofing.

Congo is sometimes called "the never-leak roof" on account of the way it resists the water, and no one should select this roofing without investigating Congo. Congo is a splendid roofing, and the price is unsually reasonable. Write for a sample at once, addressing The Buchanan-Foster Company, West End Trust Building, Chestnut street, Philadelphia, or Monadnock Building, San Francisco.

THE CALKINS NEWSPAPER SYNDICATE PUBLISHING HOUSE

ITS RISE AFTER THE DISASTER OF 1906 ONE OF THE FEATURES OF SAN FRANCISCO'S REHABILITATION

The entire plant of The Calkins Newspaper Syndicate was swept away by the fire of 1906, that leveled the greater part of San Francisco. All The Syndicate had left was the grit and enterprise of the men at its head and the good will and esteem in which it was held by the public.

For these men there was no time for weeping over the ashes of disaster. The welfare of the stockholders made action necessary. Within a very short time the big publishing house was re-established in a temporary wooden building at 24 Clay Street—in the former business section—and was going ahead with its old staff of expert printers, photo-engravers and artists and its several editors and other employees. Machinery had been rushed from the East.

Hardly an issue of The Syndicate's various publications was omitted. Printing and engraving orders were filled again in a very short time.

The masterly and rapid manner in which this concern rallied and its growth to still greater magnitude make one of the inspiring chapters in the rehabilitation of the city—of the rebuilding of a greater San Francisco.

This beautiful special edition of Orchard and Farm, one of the finest publications of the sort ever turned out in America, was issued entirely from the temporary quarters.

As this special edition is being run from the presses in the old quarters, though, The Calkins Newspaper Syndicate is moving into a splendid six-story building at Battery and Commercial Streets—one of the many that are rapidly obliterating the wide scar made by the fire as San Francisco springs upward again.

In this building has been installed the most modern printing, book-binding and photo-engraving machinery and appliances that could be purchased, including color presses of the latest model. There will be no better equipped plant in the United States—none that can do better work or turn it out more quickly than this one.

The Calkins Newspaper Syndicate is the largest publisher of periodicals and newpapers on the Pacific Coast. Its class publications are authority. Among these are the Pacific Miner, containing all the latest general and scientific mining news; Orchard and Farm, full of valuable and entertaining matter for the agriculturist; the Wholesalers' and Retailers' Review, the wine, beer, and spirit periodical, giving the persons in that trade the information they most need, and the Trade Journal, an old and valuable business weekly. All these are handsomely illustrated, ably edited by experts, and are not excelled by any similar publications, East or West. They circulate widely and are recognized as valuable advertising mediums.

The Pandex of the Press is a unique and valuable monthly owned by this Syndicate. It keeps you alive to all that is happening throughout the country and the world and should be in every family, for it is an educator of the best class. None can take all the great newspapers of the country. The Pandex fills their place, and everybody can take it. It contains a symposium of all the leading news topics, besides reproductions of the leading cartoons and also editorial comment from the brightest minds. You keep up with your country when you take it. The Pandex has a peculiar field and is gaining wide circulation and popularity.

Promotion literature of the finest type can be turned out by this plant. Towns and rural communities wishing any work of that sort would do well to write. The Calkins Newspaper Syndicate with its fine photo-engraving plant and artistic color processes can publish handsome booklets, pamphlets and folders.

The present address of this publishing house is 24 Clay Street. After November 15 address,

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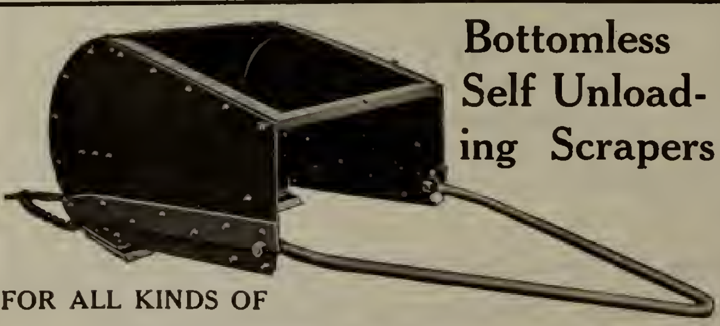

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NORTHERN CALIFORNIA.

As this number of Orchard and Farm will reach a hundred thousand readers, and be preserved as a book of valuable reference, we deem it timely to answer a number of questions concerning Northern California in this department.

We are taking the Orland region as a typical example of a section whose products are augmented by irrigation; though we are not describing the system in this column.

Thousands of readers will desire information about climate, scenery, rains, products, and so forth. We reprint the following from "The New California," a large two-volume history of this State, by permission of the Lewis Publishing Company, of Chicago, and of the Lemon Home Water Power and Light Company, of Orland. Both the history of California and "A Lemon Home in California," from which we copy, were written by Leigh H. Irvine, editor of Orchard and Farm:

The Search for Happiness.

No spot on earth can make a man happy, no belt of sunny seas can give him peace—unless the conditions of happiness also exist in his mind and circumstances. Health and heredity, temperament, domestic relations, personal ambitions, and many like elements, affect people's lives, no matter where they dwell.

It was our wise Ralph Waldo Emerson who said that the light of the world comes from the soul of the observer; therefore it would be a shallow person who would proclaim California or any other country a panacea for all personal ills. Conditions being equal, however, some countries appeal to all men more strongly than others. Why? Because we are so wonderfully made that even the dullest mind is stimulated to enjoyment under happy climatic, scenic and social conditions; and to higher minds nature is alive with poetic suggestions, and there is romance in the very sky, for

Thou canst not wave thy staff in air,
  Or dip thy paddle in the lake,
But it carves the bow of beauty there,
  And the ripples in rhymes the oar
    forsake.

The great English philosopher, Buckle, wrote some interesting chapters to show the marvelous effect of climate on men and their institutions. It hardly required a very profound philosopher to demonstrate the main facts of the statement that climates influence civilization; for even the commonest plowman can soon understand why the dark and cold Arctic regions produce such unsatisfactory specimens as the Esquimaux—beings dwarfed in stature and mind, a people of little importance to the world. How could any race thrive in a climate so dark and savage that life is little more than imprisonment? and how can anybody escape the evil effects of bad climates, the uplifting effects of good ones?

By similar reasoning the plowman might account for the broad-minded generosity of the western man. Accustomed to an out-door life of adventure, in a land of inspiring scenery and untold resources, the Californian in particular stands firmly on his feet and faces the future with courage. Climate and soil alone cannot make him or any man happy, but there is no land where nature has done more for man than in the great country beyond the Sierra of Western America. It is a region where the average visitor will not only behold new and strange scenery, but where he will find life full of fresh experiences and opportunities. The people and customs will be strange and pleasing, and the scent of woods and flowers, the glimpse of mountains and sea, and the smell of lemon groves from afar, will tell the story of a mild climate and a varied soil.

Seeking a Happy Home.

The charm of adventure enters largely into the question of everybody's happiness, for the same delight in incident that holds the readers of Robinson Crusoe still makes California the day-dream of men and women who have passed the age of youthful romance—for the oldest of us are but children older grown. We desire to be amused, and it is only natural for us to seek a place of

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change and rest for the evening of life. Year by year we learn by the signs and hints of coming age that the life of the oldest man is so short that it is often a problem how and where to spend it to the best advantage. It was Bill Nye who said, "We ought to have a good time while we live, for we are a long time dead."

It requires no argument to convince people that the happiness and prosperity of everybody depend largely upon geographical location. Nobody is happy in jail, or amid cyclones, or in a climate that exhausts health and vital energies; but all sane people—invalids as well as those in the pink of health—enjoy sunshine and bracing air, balmy days, refreshing nights, and bountiful harvests. The picture of an earthly paradise has not lost its charm, even in the era of commercialism; and actually or ideally the search for a Garden of Eden is the dream of mankind. For such reasons it does not seem strange that the fables of India tell us that the first men ate of the earth and found it deliciously sweet. Even to this day some countries hold us with a charm so great that their very names suggest something unusual and fascinating in experience. Egypt and the Holy Land, Rome and the splendors of the Orient bring up pleasing pictures; and in our own country the word California has a place almost as settled and sacred as the Declaration of Independence. To some it is a symbol of all that is beautiful in nature—gold mines, ancient forests, fields of yellow grain, a veritable empire of wealth. To others, it is a country where everything is overdone (except the truth), and where human vultures lie in wait for "tenderfeet" from the East and the wide world.

Truth About the Golden West.

Of course the truth lies somewhere between these extreme views, and the average man with a few thousand dollars and a few ounces of brains will find wide areas of California where nature gives the most generous harvests that sunshine and rain and the toil and ingenuity of man have ever brought forth—all in a climate that the world does not surpass, a land where June is never far away; yet where there is no death in the hottest day, and where there is the warmth and poetry of life in the coldest winter night, except in the mountains and far beyond the regions of agriculture.

Mother Nature has provided a chair and a plate for every honest man who gets an even start in California, and the Mediterranean shores of America are fertile enough to furnish a feast for all. None need stand at meal time, none need freeze, and those who remain long learn to love the land with a devotion that is proverbial. Such are the reasons, in part, that have impelled all sorts and conditions of men to seek the land of the setting sun as a place for homes and happiness.

No Gold on the Bushes.

But there are cautions that should be heeded. He who desires to come to California should remember that nobody has ever yet lived on climate, nor has anybody prospered by viewing mountains, cascades, lakes, caves, geysers, or petrified forests. Mysterious mountains that rival the Alps are good for tourists and poets, the Yosemite Valley is more wonderful than Niagara—but the average man has a question that precedes all these. He must know how he is to get on in the world, how he is to support and educate his family; and he must solve many practical questions before he buys a ticket that means a change of home. Lemon groves and prosperous vineyards are moonshine to a man who has not where to lay his head and is without a loaf to stay his hunger. While a man with a few thousand dollars can probably do better in California than in most places, it is not a pauper's paradise—and nobody has ever found gold growing on the bushes, even in the richest areas of the great empire of the Pacific Coast.

Northern California.

While California never has been separated into such political divisions as correspond to the points of the compass, its area is so great, and the climatic conditions of the various sections are so different, that the northern part of the State demands separate description. This will be

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SOUTH SAN FRANCISCO, SAN MATEO COUNTY

better understood when it is explained that California has an ocean frontage of more than eight hundred and fifty miles, and that it comprises a domain that corresponds in latitude with that part of the Atlantic seaboard extending from Plymouth Bay, Massachusetts, to Savannah, Georgia. The New England States, New York, New Jersey, Delaware and Ohio combined do not comprise an area so great as that of the Golden State.

The great San Joaquin River basin alone is two hundred and fifty miles long by sixty in width. It contains six counties, the smallest of which is larger than Connecticut. The climate of this vast area differs from that of southern California, having more rain in the winter, and cooler nights in summers—but it should be remembered that northern California does not begin until the San Joaquin Valley ends; and the region north of the San Joaquin is blessed with generous winter rains, a dry, healthful summer climate, and such fertility of soil that all crops thrive.

When grazing gave way to agricultural pursuits great wheat fields supplanted the ranges, and later the broad acres that were wheat fields became the famous citrus belt of northern California, covering a marvelous region of production west of the snowy ranges. This is a picturesque and fertile area extending from Redding to Sacramento, cut off from the plains to the east by the snow-capped Sierra, while oceanward the dark blue Coast Range, ''forest-crowned and rugged, marks the westerly mountain chain of the continent.''

Where Everything Grows.

Geologists and farmers alike agree that the soil of northern California, especially in Glenn County and the region surrounding it, is wonderfully rich and adapted to the successful growth of many kinds of products. The soil of the Sacramento Valley was formed at the bottom of an immense lake which received the washings of the surrounding mountains for thousands of years. The decomposing granite and vegetation of ages formed the basis, and centuries of washings since have made a light vegetable mould, mixed more or less with clay and sand. Vegetation of all kinds thrives in the untrodden wilds, and no man has yet discovered a limit to what may be done by cultivation. Wherever subdued the earth brings forth a profusion of trees and flowers, citrus and deciduous fruits—and every condition for a land of happy homes exists in the rich lands of the great Valley.

A writer who has lived for many years in the section now named Glenn County says that the range of productions in the same sized area is not equaled elsewhere on the globe. The products of the temperate and northern tropical belts grow side by side to perfection. The pine, the palm, the olive, the apple, the orange and the pear, the lemon and the palm abound and thrive on the same acres. Every cereal reaches its highest production, and vegetables of all kinds are nowhere excelled in either quantity or quality. Nut-bearing trees grow to great size and become wonderfully prolific, and textile plants like flax, hemp and jute flourish. For many years Colusa County, from which Glenn was carved in 1891, was the banner wheat region of the world. In 1880 it produced seven and a quarter millions of bushels of wheat in excess of what was consumed in the county and held for seed.

The winters of the Valley are so mild that stock never has to be housed, hence dairying and stockraising are highly satisfactory industries. Potatoes, onions, carrots, parsnips, beets, turnips, sweet potatoes, peanuts, lettuce, tomatoes, green corn, peas, beans, cabbage, melons and like vegetables grow as well as anywhere in the world—and nearly all fruits and vegetables are in the markets about three months earlier than in the East.

A Land of Eternal June.

Aside from agricultural and business reasons there are many other blessings in this highly favored section of the State. It would be difficult to over-estimate the spiritual and economic advantages of climate, the exhilaration of balmy air, the rare and never-tiring charm of the seasons. which are tempered with the mingled glories of mountain and sea, the far-reaching climatic effects of the Pacific Ocean brooding over all.

It should be explained that there are few days in the year that are wasted by reason of bad weather. The Sacramento Valley, which is the upper one hundred and fifty miles of the great Central Valley of the State (the San Joaquin Valley being the lower part), is in many respects more like the East in its climate and products than any other part of the Pacific Slope — this largely owing to the ability of the country to produce crops without irrigation, and owing to somewhat more decided changes of season than exist farther south. In this connection it should be borne in mind, however, that the great Japan Current so equalizes temperatures that latitudes are not so much a guide to climate as are altitudes. It

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THAT is often the problem with irrigators—the water is lower han the head of the ditch.

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If the only available water was a lake or pond below the land, irrigation was usually abandoned, because it was thought that the water could not be pumped up in sufficient quantitiie or the pumping operation would be too expensive

Irrigators know better these days.

They are now placing I. H. C. gasoline engines on the banks of these low lying lakes and converting the waters to a beneficial use on their thirsty lands.

They no longer find it necessary to build miles of extra ditch to get fall enough to reach the lands. An I. H. C. engine will take the water from the stream where it flows through or near the farm, and raise it any reasonable height.

Irrigation problems are solved with the I. H. C. engines, because they have three main characteristics that adapt them to the work:

First—They pump water in unlimited quantities.

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Third—They make a near approach to self operation. When set going they run for long intervals, regularly and dependably, with the least possible attention. The result is that I. H. C. gasoline engines are completely changing irrigating methods. Fertile but dry uplands are being brought under cultivation where a few years ago that was thought to be impossible.

Have you a dry farm on your hands?

Or do you know of a fine piece of land you would homestead if you could get some "unappropriated" water for it?

There is no reason why you should abandon your project. There's always near at hand a low lying lake or a slough or an underflow or a well or a stream down at the foot of the bluff. Find any one of these and an I. H. C. engine will put the water where you want it.

The engines are made in various styles, Vertical, Horizontal—Portable and Stationary. They range from 2 to 20-Horse Power.

Look into the matter and see which one of these irrigating powers will do for you. The local International agent will be glad to talk over your particular case, furnishing catalog and giving engine particulars. Or, if you prefer, write nearest branch house for catalog.

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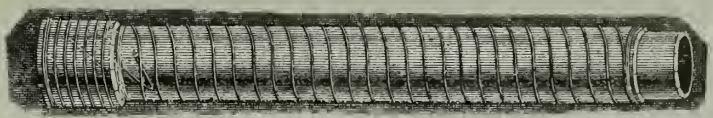

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Hose is made of 12-oz. army duck, rolls up flat, is light, easily handled, and with good care will last several years.

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2½ inch	.04½ "
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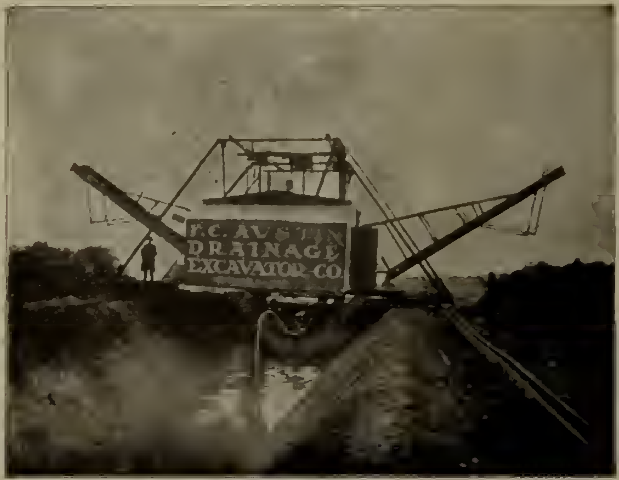

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ARE AUSTIN DRAINAGE EXCAVATOR DITCHES

An irrigation ditch must be perfect in grade and sectional profile. It is not dug to carry away waste water, but to carry water as a commodity from places where it is plentiful to places where it is scarce. Salvage, not waste, is the governing motive, hence it is that irrigation ditches are dug so perfectly and often lined at great expense with stone or concrete.

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is a machine for **digging perfect ditches,** and it is the only machine that digs ditches with bottoms true to grade and sides to perfect slope by a **single operation and in one process.** The original soil is not disturbed or loosened an inch below the required profile—it is, therefore, **left as impervious to leakage** as it ever was and in the best possible condition to serve as a foundation for lining, if a lining is desired. The spoil banks are deposited far enough to the sides to leave wide berms.

The Austin Drainage Excavator is a dry-land machine—the only water it needs is boiler water—hence it is an arid-region machine and as much at home on the deserts of the West as it is in the overflow lands of the East, where it has dug hundreds of miles of drainage ditches. It digs a ditch with sloping sides and smooth bottom in one operation, moving along the work under its own motive power—**no slopes to trim, no berms to clean;** no horses or mules to provide with forage and water, no army of teamsters and scraper holders and shovelers to pay and feed and keep from striking. The illustration here shows a drainage ditch. Did you ever see an irrigation ditch dug more perfectly? Bear in mind that the ditch shown is just as the Austin Drainage Excavator dug it: **it is a completed ditch.** Send for our Catalogue K and form letters; they show other pictures of perfect ditch work.

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is elevation above the sea level, not proximity to the equator, that enables one to ride in a few hours from beds of roses and strawberries to fields of eternal snow.

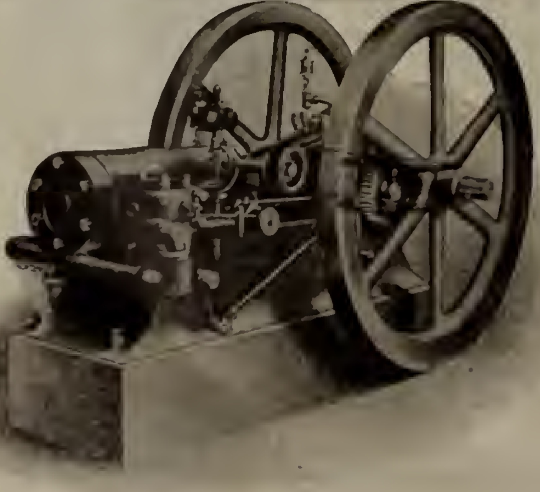
The equalizing factor in California's temperature is the Japan Current, that warm river of the sea which gives the western coast of America the balmy climate of mildest Italy, the skies of Egypt and the luxuries of the valleys of the Amazon. Starting on its marvelous journey beneath the fierce and never-ending suns of the equator, in a latitude southwest of Mexico, this marvelous ocean stream plows its way through the vast solitudes of the Pacific, gathering increased heat in every mile of its course through latitudes of equatorial summer. After a flow of ten thousand miles through the hottest of climates this stream strikes the eastern coast of Asia, turns northward, then forces its way through the waters of the northern Pacific, sweeps the shores of Northern California, then flows southward and bathes the entire state with the tropic breath of heat and life.

Northern California feels the good effects of this great climate-making stream, which is one reason that enables it to produce semi-tropical fruits as well as regions of summer like San Diego. While the July thermometer ranges high at times there are climatic influences east of the Sierra that prevent the humidity (moisture) from being great. In New York and Saint Louis people die when the thermometer reaches 95 degrees above zero, but men work in the fields of California when the thermometer is far higher, and there are no evil effects from such exposure. Sometimes the thermometer runs quite high in Glenn County, but the nights are invariably cool, and the refreshment of balmy sleep never fails to knit the raveled sleeve of care. The County is not so far removed from the coast as to be exempt from the good effects of the sea breezes of summer.

The Charm of the Golden West.

William H. Mills, one of the greatest students of Californian matters, has given some of the reasons that impel Californians to speak with pride of their state. A few sentences from his eloquent description are not out of place here. He says:

"Under our summer suns the fruits of the tropics ripen, unaccompanied by the discomforts of the torrid zone. Here the brown of our summer hills and the golden stubble of the after-harvest are the only winter that we know. Here a spring-like verdure is the harbinger of coming autumn, and



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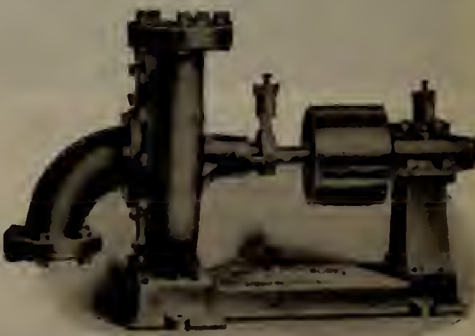

autumn is attended by no forewarning of the bleak rigors of winter. Here winter is the season when the warm, brown earth is turned by the plow for seed time, and spring, with its flowers and ripening grain, is opulent with the prophecy of hopeful industry. Nor are these all the features which challenge our love of country. Here nature has wrought her best enchantments in the sublimity of mountain heights, the bold grandeur of cliffs, the pensive peacefulness of lovely valleys, and the expansive splendor of fertile plains."

It is not strange that such a land has always appealed to far-sighted men like Horace Greeley and Bayard Taylor—that they have ever beheld the vision of a glorious future for the industrious millions destined to till its fertile acres, and that each year many families, weary of the heats and burdens, the storms and uncertainties of other lands, find themselves happy under the benign skies that led the Argonauts of old to seek happiness in the days of romantic adventure, when the West was undisturbed in the solitude of its isolation.

So potent is the charm exerted by the combined effect of climate and scenery in the Golden State that those who once fall under its strange spell are loath to leave it—and those who go away are forever haunted by the vision of its snow-capped mountains, its thundering surfs, and rich valleys that recall pictures of plenty and prosperity, where man was made to be happy and free.

The Charm of Glenn County.

Of the beauties of Glenn County volumes might be written. It is a region of such splendors of landscape and climate that poets might tell of its tempered and scented air, of its charming expanse of valley, and of its scenic glories; but the object of the present writer is to give a practical idea of its climate, resources and educational advantages for the information of the man in search of a home in the West.

The reader who has studied what was said in the preceding pages will have little difficulty in obtaining a correct idea of the county under consideration. Everything good that has been said or that may be said of northern California is applicable to Glenn County; for it is no exaggeration to say that all that is beautiful and inviting in the great Northern Valley of the State is found in its luring perfection here. Not only is there not a better spot on earth than this County, but there is not a more delightful and profitable home country anywhere from Shasta to the southern boundaries of California than may be found in the territory embraced within the limits of the county of Glenn. It comprises the larger half of what was until May 5th, 1891, the fertile and famous county of Colusa, banner wheat area of the world in the eighties. Nestling in the heart of the Sacramento Valley it contains fourteen hundred square miles, and its population in 1899 was seven thousand and five hundred. Geographically, it lies west of the Sacramento River, and comprises more than one-fourth of the tillable area of the famous valley that took its name from the river. It is a country of wonderful forests, imposing mountains, rich valleys and picturesque landscapes; and it has been so favored by rich soil and sunny skies, bountiful rainfall and valuable rivers and streams, that it requires no prophet to see that it is destined to be the home of thousands of prosperous families.

A writer who is thoroughly familiar with the resources of the County has well said that it has an abundance of timber, ranging from sturdy mountain oaks to majestic sugar pines. Fuel is almost inexhaustible, and the foothills and valleys abound in springs and creeks which furnish large quantities of pure mountain water, the finest supply of living streams anywhere west of the Sierran regions of rain and snow.

When it is said that the area of Glenn County is nearly thirty by sixty miles the description will be seen to be more like an account of an eastern state or a kingdom in Europe than of a smaller political division. But the wealth of this inviting area is not to be seen wholly in its extent, for it must be remembered that the rich alluvial soil is sufficient without artificial fertilization, and the climate is so favorable to vegetation that citrus fruits ripen quite early.

Turn the Wick

as high as you can—there's no danger—as low as you please—there's no smell. That's because the smokeless device prevents smoke or smell—that means a steady flow of glowing heat for every ounce of fuel burned in a

PERFECTION Oil Heater
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You can carry it about and care for it just as easily as a lamp. Brass oil font holds 4 quarts burning 9 hours. Handsomely finished in japan and nickel. Every heater warranted.

The Rayo Lamp adds cheeriness to the long winter evenings. Steady, brilliant light to read, sew or knit by. Made of brass, nickel plated, latest improved central draft burner. Every lamp warranted. If your dealer cannot supply Perfection Oil Heater or Rayo Lamp write our nearest agency for descriptive circular.

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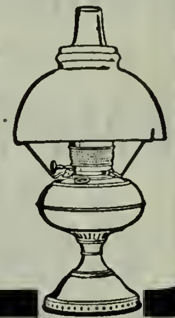

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Write for our free booklet "FARMERS' FRIEND." Valuable to farmers and ranchers.

Stock Ranches

HERE'S two of the best stock ranch propositions ever offered in the State of California. 5200 acres on Stony Creek, Glenn County, 1,300 acres can be irrigated. 1,000 acres fine alfalfa land, 350 acres now in growing alfalfa. 1,000 inches free water always available. Land absolutely controls 16,000 acres of Government Forest Reserve. Splendid grazing land, nominal rental. Four large hay and feed barns. Only 20 miles to railroad over good road. Reason for selling, owner is non-resident and tenant, who has been on the ranch for 12 years, retires this fall on account of old age. Will sell at a sacrifice.

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Nearly 3,000 acres on the Sacramento River. 1,000 acres splendid alfalfa land. 100 acres now in growing alfalfa. Seed on ranch for 1,000 acres more. Several hundred acres in Legal Tender grass. Several hundred acres of corn land, produces from 50 to 75 bushels per acre. 7,000 cords of wood on the ranch. River transportation daily. This ranch will make one of the finest hog and sheep ranches in the State. Good improvements. Rural free delivery. 20 mules, 100 hogs, 65 cattle, 6 brood mares, and all farming implements go with the ranch. Price and terms apply

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A SUCCESSION OF VEGETABLES

There is scarcely anything that means so much enjoyment for the dwellers in country homes as a good garden, and to have this we must do more than simply make one planting in early spring. It is a good plan to procure early in the season a goodly supply of the different seeds, especially such as may be planted at intervals, so as to have vegetables fresh and tender all the season through. Peas in this climate we cannot have after the hot, dry summer days come upon us, but by planting a number of varieties at different times in the spring we may have them much later than most people do. Sweet corn is one of our nicest vegetables and one that may be had from early summer until after frost under proper management. String beans are another important crop that will grow and do well no matter at what season they are planted after the ground is warm in spring. But they must be planted in time to mature before frost. Many people err in making but one planting of melons, for though watermelons and muskmelons should be planted for a succession of the late crop is generally appreciated as much as the early one. Several plantings should be made of cucumbers also.—Colman's.

It pays to cultivate the garden often, no matter what is being grown in it. After every heavy rain the crust formed by the rain should be broken up as soon as possible to prevent the escape of moisture, and also to let the air into the soil. The greatest good this does is to keep down the weeds that are the greatest drawback in gardening. It is cheaper to cultivate the garden often than it is to wait till the weeds have obtained a vigorous start and try to dig them out. Many a garden has been declared a failure where the only cause of failure was the lack of frequent cultivation.

It is said that Secretary James Wilson of the Department of Agriculture is the only member of President Roosevelt's Cabinet who is able to live within his salary of $8,000 a year. The secretary is a man of simple habits, and has no family except a daughter, who is studying abroad.

Not less remarkable than the rush of homeseekers to the West is the movement of the great stock breeders to give up stock raising for farming. The lands are too valuable now to be devoted to grazing, and they can make more money in wheat raising.

GREEN BUG SCARE.

The green bug scare in Kansas is said to be about over. There would be fewer green bugs and all other insect pests to devastate the crop fields of the country if the farmers would compel the enactment and strict enforcement of State laws, which absolutely would prohibit the destruction of their friends, the birds. Birds are natural enemies of all field insects, and if permitted to live and multiply, there would be little danger from that source. The prairie chicken and the quail especially are destructive of the insect tribe, but every fall they are pursued in field and wood by "sportsmen" from the cities, who swarm the countryside and destroy these best friends of the farmer. Not content with a few birds for the day's food, they kill by the thousand, and, in the wanton slaughter, the larger birds yearly are becoming more scarce, even the song birds included. The spirit is to "kill something," and this destruction has been going on savagely, lawfully and unlawfully, until now, the feathered tribe no longer on guard, insects have become the greatest menace to growing plants the farmers have to fear. In Kansas, where the green bug has been the worst, there are few prairie chickens or quail, except in the remote southwestern counties, where the statute absolutely prohibits and where "sportsmen" are afraid to go. In these counties there is an abundance of prairie chickens and quail—even the mountain quail has come in—and it is significant, by the way, that the wheat fields have been vigorous all spring in that section, and there have been no green bugs to devastate them.—The Earth.

ON NUT CULTURE.

Fred S. Dawson of Starke, Florida, contributes the following on nut fertilizing to the Industrious Hen:

Several inquiries have been received of late why pecan trees have borne regular crops in years gone by, have stopped bearing, also why trees heretofore that have had good crops of well filled nuts, sometimes filled with meats—this happening usually when the crop was unusually heavy.

As these inquiries have come in pretty much all in a bunch, I will answer them in a bunch. All of the inquirers probably know that if you plant cotton or corn, or any other crop, on the same land, year after year, that soon that land will not produce cotton or corn, because the properties in the soil that go to make a good crop of either will become exhausted. It is the same with pecans as with any other crops. When your pecan trees come to bearing size, and for a number of years bear

Everything for Spraying

Let us quote you on everything you need including bluestone, and all spraying materials. We have the best goods for the purpose, lowest prices and make prompt shipments.

SPRAY DOLLARS

Many growers who sprayed this year for the first time secured $200 more per acre for peaches than ever before.

Don't think your orchard is too far gone. We will help you make it pay and your success will bring us other orders.

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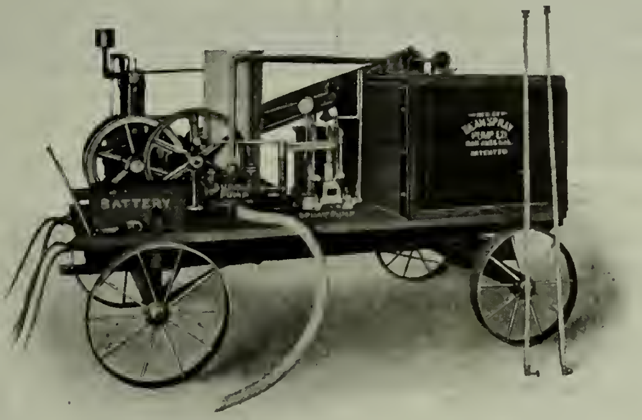

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BEAN POWER SPRAYERS are known the world over. Simple, complete and ready for use.

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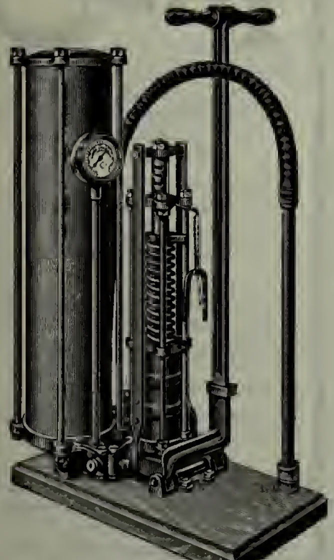

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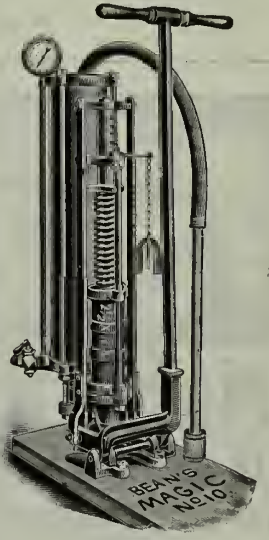
No wonder they are big sellers! Think of what this means—Saving of one-third of all your labor cost.

Putting the material on with one-third higher pressure. The pump, simplicity itself; no valve or other trouble, but thorough spraying at the least possible expense.

The saving in labor will pay for the pump and your spraying will be so much better done that any other pump would be expensive if you got it for nothing.

Send for Catalogue No. 20 for full description and prices. Freight paid to your station. If you want to get results investigate these pumps at once.



Spraying and whitewashing. Have you a "family orchard?" Have you whitewashing to do?

This is a splendid outfit for small jobs—no matter what materials you use.

This No. 60 is a very simple pump, easily mounted on a barrel, and it won't wear out—except two of its inexpensive parts—while you are here to tell about it.

CATALOGUE NO. 20 DESCRIBES FULLY

Price is low, delivered at your railroad station. Write us.

BEAN'S LITTLE GIANT

The Best Barrel Pump

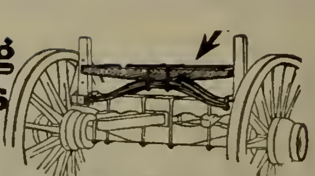
Everything you could want in this style of pump. Fastens in any barrel or tank.

Agitates perfectly. Has large air chamber. Also ball valves and never-wear-out cylinder.

You can't afford to HIRE YOUR SPRAYING DONE when you can get so good a pump for so little money.

Write us for prices on this pump delivered at your depot.

Also all spraying materials.



Put These Easy-Riding Money-Saving Springs On Your Farm Wagon

Double the Life of Your Wagon. Harvey Bolster Springs will actually keep the wagon-bed from **bumping up and down** and **pounding** both itself and the running gear to pieces. You never saw a **freight car** without springs under it, did you? Why, such a car wouldn't last a year on the smoothest railroad track. Then how can you expect a wagon without springs under it to stand the **continued bumps and jolts** of a country road? You can't expect it and shouldn't. What you want to do is to put a pair of **reliable Harvey Springs** under your wagon-bed and stop that awful wear and tear on your wagon.

Free Trial to YOU

Get 35% More for your Produce. Do you **realize** how many dollars you lose hauling **potatoes, eggs, apples, melons**, etc., over rough roads which jam and bruise them until they are hardly salable? Don't you know that, without saying a word, fruit buyers offer from ¼ to ⅓ less for fruit which is brought to market in a wagon without springs? Ever figure up the **damage** your wagon does to **furniture** and other **merchandise** you haul home? Do you know that these losses in a year amount to many times the cost of a pair of **long-lasting Harvey Springs!**

RIDE IN COMFORT! In a few minutes, with Harvey Springs, the **hardest-riding lumber wagon** can be made into a comfortable spring wagon that rides almost as easy as a new carriage—a nice, **smooth-running** wagon that doesn't rack your bones and jar your spine at every rut in the road.

THE EASY-RIDING HARVEY BOLSTER SPRINGS

are scientifically made by people whose sole business is **making Springs.** **Twenty years** of practical experience are behind these **wonderful springs.** Every leaf is made by our own **special process** from the very finest tempered steel. Harvey Springs are **guaranteed** to give perfect satisfaction in every way. They will **outlast** the best wagon you can buy.

Try a Pair 30 Days FREE We want you to **put on** a pair of Harvey Springs and use them **FREE** for 30 days to find out for **yourself** what **money-savers** and **comfort-givers** they are. If you like them and decide to keep them you may be certain that you **always** will like them, because every pair of Harvey Springs are guaranteed to **retain** their **strength** and elasticity for years.

Drop us a postal, giving weight of your heaviest load and your **dealer's name**, and we'll send you our catalogue and arrange with him to give you a set on **30 Days' Free Trial.** Be sure to write TODAY—before you lay down this paper.

For a pair of Springs on Free Trial, address **HARVEY SPRING CO. 416 17th Street, Racine, Wisconsin**

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SEE WILSON ABOUT IT

heavy, regular crops, the natural phosphoric acid and potash in the soil becomes exhausted, and then the good bearing trees of the years gone by, stop bearing, or bear very few nuts, or only bear every second or third year, or bear a good crop of half filled or empty shells. It takes phosphoric acid and potash to make nuts and to fill them full of rich meats.

If you have any trees that have quit bearing or are not filling well, but have borne well and have filled well heretofore, during July or August give them a good application of some high grade, complete fertilizer, with a high percentage of phosphoric acid and potash—the higher the better. Put the fertilizer broadcast from about four feet from the tree and out as far as the tree is high, and plow it in two to three inches deep. In the winter give your trees a good application of ground bone (each year), and hard wood ashes (home-made if possible) or you can put on potash in some other form. By this treatment you can make the trees put on a good crop next year, as the application of high grade fertilizer will make them set and mature this fall a large quantity of bloom buds, and make the tree hold its fruit next spring. The winter application of ground bone and potash will make the nuts hold and fill out well. Then each year put on an application of ground bone and potash, and once every couple of years give your trees some stable fertilizer. Plant a crop of peas each summer in July and plow them in in the fall.

Do not let your grove, or around your trees, grow up to grass or weeds. Keep them clean, plow or harrow them, cultivate them, hoe them. Do not let grass and weeds take your fertilizer after you have put it there—your trees and nut crop need it. Also they need all the moisture. Cultivate and keep the trees clean until July, then sow a cover crop of peas, and in the fall plow them in. While the peas are growing keep around the trees hoed clean for from five to eight feet from trees all around.

If you do this you will get regular crops of well filled nuts. Fertilizing pays, but cultivation pays better. Do not take crop after crop from the soil, and put nothing back, for if you do you are simply starving to death the goose that is laying the golden eggs for you. Figure on putting back twenty to twenty-five per cent of the value of the crops, and you will never be disappointed by a failure of your nut crop.

By the above I mean to bring trees that have ceased to bear that were once good bearers back to their old time prolific habits. Or if I refer to grafted trees of good bearing varieties. There are thousands of seedling trees that have never borne, also that bear large crops of shells filled with shrunken kernels, or half filled shells, or shells with no kernels at all. For these, I am of opinion, from experience, that if you put on enough fertilizer to kill the tree, it will make no difference. They

OWN an apple orchard in Arcadia, Washington, and be independent and avoid cold winters. $10.00 down and $10.00 a month in Arcadia will bring you an income of $2000 a year for life. We prove our statements. Write to-day for booklet to Grant & Dye, Inc., 812 American Bank Building, Seattle, Wash., Dept. "L."

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Is cheap, durable, and quickly put on the tree. It prevents rabbits from destroying your trees. A sure protection against frost, sunburn, grasshoppers or dry winds. Can be easily removed; will last for years

Send for samples.

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PRICES:

12 in. long $9 00 per 1 M.
14 in. long 11 00 per 1 M.
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will not hear, nor will the shells fill. They are simply non-hearers or hearers of imperfect fruit, and it is their characteristic as seedlings. The only way to change them over to make good bearing trees is to cut their tops off and graft or bud them to good bearing varieties. You can usually grow a cut-off top in two or three years, when they will commence to bear, and will hear acording to the characteristic of the tree you take your grafts or buds from.

Quick Work in Packing.

In picking apples in my own orchard and in orchards that I buy, I do not allow an apple picked until I am there to commence barreling same. I never let an apple touch the ground that goes into a barrel. In picking I use half bushel baskets and short sacks hung over the picker's shoulder. Use long and short ladders entirely, as pickers climbing in among the limbs bruise the apples that are in sacks and spill apples out of the baskets.

I pack entirely from packing tables that are built on a slight slant, the wide end of the table being padded to prevent the bruising of apples as they are being poured onto the table. The narrow part of the table is slatted with lath one inch apart, which allows twigs, leaves, etc., to drop through. At the mouth of the table I have an apron that is tacked to the under side of table; this we lay over the barrel, allowing the apples to run into it. When the apron is full we lower it into the barrel, which prevents the bruising of apples as they are put into the barrel.

The cost of picking and packing covers a wide range where trees are heavily laden, the cost being not nearly as large as when there is a light crop. Under ordinary circumstances the picking and packing can be done for fifteen to eighteen cents per barrel. I work four men at the packing table, one man to face, one to press, one at mouth of table to run the apples, and one to sort out culls.

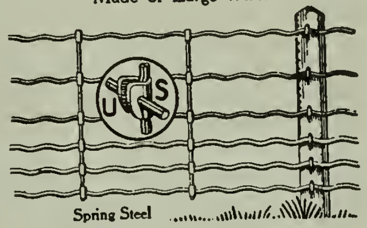
The packing table does away with having cull apples all over your orchard, as all the culls are thrown under the table. When the time comes in the fall to gather your culls and windfalls for making cider, it is a very easy matter to drive from pile to pile to pick up the apples and put them in the wagon. I have my teams ready to haul my apples to cars, where they are put in cold storage in St. Louis in fifteen hours from the time they were hanging on trees.—A. T. Nelson, Laclede County, Mo.

The live stock and agricultural resources of the great San Luis Valley in Colorado are concisely set forth in an attractive illustrated folder just issued hy the passenger department of the Denver & Rio Grande.

The text is by Clarence A. Lyman, the well-known newspaper farmer writer.

Nevada U. S. Fence,

Made of Large Wires



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NIAGARA GAS SPRAYER

The above cut represents a 150 gallon Niagara ready for action. It is a time and labor saver. There is no pump, engine nor machinery about it, therefore is easily kept in repair. Niagara (Brand) Sprays Excel all Others. Manufactured by . . . . .

GAS SPRAYER MFG. CO.

SAN JOSE, CAL.

Live Stock and Dairy Interests

OLD HORSES.

THE success of Our Dumb Animals and all sucb publications is due the humane features inculcated into the minds of the readers. S. J. Soverhill, of Bureau county, Illinois, writes as follows for the Farmers' Review:

"Use the old horse that bas done such good and faithful service for light work and give him a driver tbat will not abuse him. Give him such feed as be can eat and digest. Do not turn him out to die or to get down in some ditch or hole and suffer for hours. You are returning no kindness for the many hard days' work he has done for you. From seeing the many sad endings of old horses my idea would be to chloroform or shoot and bury them witbout further suffering. Often people wish old horses were out of the way, but no one likes the job of putting tbem out of the way. Give a man $2 to kill and bury the old horse and one will have a clearer conscience than to let him die as most of tbem do."

SILOS IN SWITZERLAND.

In describing the introduction of American silos into Switzerland, Consul F. B. Keene writes from Geneva:

Just outside of Geneva there is a small but model American farm, tbe property of an American gentleman who bas long resided in this city (name on file at the Bureau of Manufactures). To a model dairy and equally up-to-date quarters for fowls and swine, the owner last autumn added two 75-ton American silos. While twelve acres of fine American corn were being ground and packed into these, farmers came in from the country round about to see what to them was a curiosity and a revelation. There were as many as fifteen or twenty in a day. These silos were, as far as I know, the first to be set up in Switzerland. During the past winter they have fed 30 head of fine cattle. The practical illustration of wintering 30 head of stock on the 12-acre crop of corn has resulted in inquiries for seed corn and in orders for 3 silos by farmers who came, saw and were convinced.

Each of these 3 silos will be a new advertisement for tbe system, wbich is bound to spread. The American model farmer in question grinds his ensilage by electric power. It may be that, in a country abounding in water power, the spread of silos will create a demand for electric motors, in which our American makers may find it profitable to seek their sbare.

AMERICAN HORSES.

The Northwestern Stockman and Farmer makes tbe following sensible remarks:

"We are advised that Homer Davenport is about to send one of his so-called Arabian stallions across tbe country from Oregon to New Jersey in an effort to convince the Government that the Arabian is the proper blood from which to breed horses for our cavalry. We regret to note that tbose in charge of our military affairs have taken official notice of this performance and will be represented by an official timekeeper.

"It seems utterly ridiculous to believe that any one could be hoodwinked into believing that the Arabian possesses merit in excess of that possessed by any American bred horse.

"The time was when the Arabian as foundation blood had something to impart, but bis virtues by comparison with present day borses have long since ceased to exist. To-day the thoroughbred and tbe standard bred borses are so far superior to the Arabian that little time need be wasted endeavoring to prove the qualities of the latter.

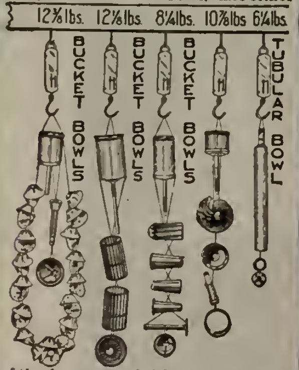
"In size, appearance, speed, endurance and every other good quality tbe American bred horses have far surpassed anything ever dreamed of by the best Arabian that ever lived."

GRASSHOPPERS AND ALFALFA.

For a while the grasshopper cast a threatening shadow over the agriculture of the West. Then the farmer got the better of him. Now be looms again—thanks to tbe vogue of

Saves Hours of Cleaning

Of course your wife would try to wash even the worst cream separator bowl properly twice every day. But why ask her to slave over a heavy, complicated "bucket bowl," like either



of the four on the left? Why not save her hours of cleaning every week by getting a Sharples Dairy Tubular Cream Separator with a simple, light, Tubular bowl, easily cleaned in 3 minutes, like that on the right? It holds the world's record for clean skimming.

Sharples Tubular Cream Separators are different—very different—from all others. Every difference is to your advantage. Write for catalog M—164 and valuable free book "Business Dairying."

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Join the Club Now Forming

If my Papa Should ask me
what I would rather have than
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a Model "M" $400
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ANY young man, or woman, husband or father earning a fair salary can become a club member---we ship KOHLER & CHASE PIANOS to reliable people anywhere.

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Our co-operative club plan sends the MODEL "M" $400 KOHLER & CHASE PIANO to your home, if in the city; or to depot here for shipment—

THE CLUB COST BEING ONLY $287.00

To share in this saving—nearly $125—you can pay as little as $10, the balance $10 monthly, (quarterly, or yearly terms if desired), and besides Club Members are given an agreement that in case of their death we give the family a receipt in full for balance due us on the instrument, **without a dollar more being paid**—provided all previous payments have been made according to agreement, and contract has been in force six months or more.

Only a few more members and the club of one hundred will be complete. Call or write for Booklet "B," which will explain the fairest, best and safest piano proposition ever made—others are furnishing their homes with pianos under our club plan, why not yours? No matter what you are offered elsewhere, investigate; it's to your interest to do so.

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57 Years In Music
Sutter and Franklin Sts
San Francisco

102 Stallions received December 18

America's Leading Horse Importers

Our clean sweep at the French Shows is followed by equal victories in America.

At the last Ohio State Fair we WON EVERY POSSIBLE FIRST PRIZE, except one, with our Percheron and French Coach Stallions. We also won Championship in both breeds. At the last Minnesota State Fair our Percheron and French Coach Stallions Won Five First Prizes, Five Second Prizes, Two Third Prizes, Three Fourth Prizes, Two Fifth Prizes, Two Sixth Prizes and One Seventh Prize. We also won Championship in both breeds.

It was necessary to divide up our horses because these two fairs occurred at the same time. There is no place in America where you can get so much for your money. Come and see us or write us if you want a good stallion.

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Kansas City, Mo. **Columbus, Ohio** **St. Paul, Minn.**

Fallon Livery Stable

C. H. BRISTOL, Proprietor

Fine Rigs and Teams for Hire

HORSES BOARDED, DAY, WEEK OR MONTH

FALLON, NEVADA

alfalfa culture. A circular marked "Approved: James Wilson, Secretary of Agriculture," tells why. The approbation is given, it is hardly needful to say, not to grasshoppers, not to too much alfalfa, but to the "hopperdozer," a clever device for asphyxiating the grasshopper in great numbers, and, as it appears, to the skunk, the grasshopper's greatest natural enemy, and "the most useful of mammals," as the biological survey contends.

But to return to alfalfa. What it does is to provide the ideal conditions for grasshopper culture—an undisturbed soil for the protection of eggs, and an early food supply for the young in the spring. "By growing a single plant over large areas," remarks the Government, "the farmer produces an unnatural condition and offers unnatural advantages for the development of the enemies of this plant, the grasshoppers." The alfalfa pest is of two species, the differential grasshopper and the two-striped grasshopper. The differential grasshopper has an olive brown head and thorax, green hind wings, yellow hind thighs marked with black, and yellow hind shanks. The two-striped grasshopper is less gaudy, varying in color from a dull green to a dull brown, with a distinct yellow stripe on each side.

What to do to these pests? Let the skunks, as aforesaid, alone and give the blackbirds, meadowlarks, catbirds, quails, prairie chickens and domestic fowls a chance at them. Furthermore, "destruction of the eggs may be accomplished by either plowing, harrowing, disking, or cultivating in the fall or winter all roadsides, ditch banks, margins of cultivated fields, uncultivated fields and grassy margins along fences." Last and chiefly, build a "hopperdozer." Make it of a sheet of iron ten or twelve feet long, twenty-six inches wide. Construct from this a shallow pan a foot wide, a foot high in the back and two inches high in the front. Fill it with water, cover the water with a film of kerosene, hitch a horse to the outfit and drag it across your alfalfa fields. All the grasshoppers in a swath ten feet wide will jump into it for a bath of death.

PROPERLY LOCATING STABLES.

An experienced farmer, writing for the Farmers' Review, of Chicago, holds that when a mistake has once been made in locating or building a stable or barn it is seldom corrected. For this reason the best location for the barn should be carefully considered. In choosing the location many things have to be provided for. The thing of first importance is dryness, for unless the site is dry the animals cannot be expected to keep healthy. More than this, if the site is wet the woodwork of the barn will suffer and much of it will decay in a few years, however protected by paints. It is also undesirable to have much moisture about a barn on account of keeping hay and grain in a proper condition. The low, flat location should be avoided, though it is a remarkable fact that very many of the barns one sees are thus located. On such a location, the barnyard soon becomes a quagmire, and is sanitary only in a dry time. Drainage would help such barnyards and such barns, but frequently the low situation makes drainage difficult, on account of the length of drain that would have to be laid and the little fall. Such a location should be selected only if all others are impossible. The best location is a high one having a large fall for the water that comes in the form of rain. It is always advisable to have the location as far as possible from low,

TOXICO CURES
ASTHMA AND HAY FEVER

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TOXICO, the great discovery for **Asthma, Hay Fever, Bronchitis** and **Catarrh** has cured thousands of the most stubborn cases. It makes no difference how long you have been suffering from any of these diseases, or how severe the climatic conditions are where you live, **Toxico will cure you.**

If you have experimented with other treatments and have failed to find a cure, do not be discouraged, but try at our expense this truly meritorious remedy.

This marvelous remedy is a scientific compound discovered by a professor of the Vienna University, Austria. **Toxico** is an internal treatment, pleasant to take, and does not derange the stomach, as the dose is only 6 drops in a small wineglass of water. **Guaranteed** under the Pure Food and Drugs Act, June 30, 1906.

Read these letters from CURED PATIENTS

A CASE OF CATARRH OF LONG STANDING.

Dec. 31st, 1906.

Toxico Laboratory:
Gentlemen:

I had a very severe case of catarrh of long standing. On waking in the morning I would have to clear my throat, and a hard lump about the size of the end of your thumb would come from my throat. Now, after using your Toxico treatment, this lump has nearly disappeared, and the continual ringing in my right ear has entirely ceased. I am well satisfied.

Yours respectfully,
W. R. BYNUM,
713 N. 19th St., Birmingham, Ala.

HAD HAY FEVER FOR 26 YEARS.

Sept. 13th, 1906.

Toxico Laboratory:
Sirs:

I have had hay fever for twenty-six years, and no one knows what I have suffered. My head and eyes have bothered me so much that I have had to stay in a dark room. Nothing gave me any relief until I tried Toxico, and since I have taken your wonderful medicine I have not been bothered once. Excuse me for not answering sooner, but I have been very busy since my hay fever has been cured.

Yours respectfully,
MRS. CLARA H. KELLER,
Elyria, Ohio. Route 3.

HAD ASTHMA ATTACKS ONCE A WEEK.

Dec. 3rd, 1906.

Toxico Laboratory:
Gentlemen:

I get asthma once a week regularly, and I have to vomit and cough; my eyes get blood red and swell up. Your free sample did not help me much, as I have asthma for a long time. You may send me a month's treatment, and I hope it will cure me.

I remain respectfully,
FORREST G. GLASSER,
Kutztown, Pa.

Read this letter received more than three months later:

March 20th, 1907.

Sirs:

I have not had an asthmatic attack since I received your first bottle—that is, after I had taken Toxico for two weeks. I used to have attacks every week. My appetite improved, and I am now strong and open chested, and can take part in athletic games. I cheerfully recommend Toxico to all sufferers and will answer all questions about the effect of your remedy. I hope this will direct a sufferer to your wonderful remedy.

I remain yours respectfully,
FORREST GLASSER,
Kutztown, Pa.

Send RIGHT NOW for a FREE TRIAL OF TOXICO before you forget it.
Address **THE TOXICO LABORATORY, 522 Townsend Bldg., New York City**

RUPTURE

Retained without Steel hoops, elastic bands or wire frames, by a patented, scientific truss made to your order, for your case. **You can try this truss for 10 days** without risking a cent of your money. Write for directions for measurement. Address Suite 309-11 Mercantile Building.

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De Laval SEPARATORS and APPARATUS Make Cows Profitable

SPECIAL PRICES ON SEPARATORS will interest you. We will tell you about them and send you a Beautiful Calendar if you will state the number of cows in your dairy and name of separator you are now using, if any : : : ; :

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Dr. Miles Anti-Pain Pills

Cure Headache

Almost instantly, and leave no bad effects They also relieve every other pain, Neuralgia, Rheumatic Pain, Sciatica, Backache. Stomach ache, Ague Pains, Pains from injury, Bearing-down Pains, Indigestion, Dizziness, Nervousness and Sleeplessness.

Pills

Prevent All-Aches

By taking one or two Dr. Miles' Anti-Pain Pills when you feel an attack coming on. You not only avoid suffering, but the weakening influence of pain upon the system. If nervous, irritable and cannot sleep, take a tablet on retiring or when you awaken This soothing influence upon the nerves brings refreshing sleep.

25 doses, 25 cents. Never sold in bulk.

wet swales and especially from pools of dead water. In the summer time these swarm with mosquitoes. The latter are hatched not only in water but in damp places. They sometimes become an intolerable nuisance to the men that have to do the work about the barns. If the barns are located near such pools and swales the residence buildings will be also located not far from them, and the people in them will also be subject to the attacks of mosquitoes. In avoiding the attacks of these insects something more than mere annoyance is involved. It seems probable now that malarial and other diseases are spread by the attacks of the insects. If the spot chosen for the buildings be on a high knoll, where the wind has a clear sweep, there will be few mosquitoes. These insects do not migrate to long distances, and they are also adverse to staying in a windy place. So a sheltered location is one of the worst locations from this standpoint. The barn cannot be located without considering how it is to affect the location of the dwelling house. It is universally conceded that the barns and dwellings must be not far apart, as otherwise the labor of caring for the farm stock will be greatly increased. Some farmers sacrifice a good location for the purpose of being near the public highway; but it is far better to have the barn and house at almost any distance from the highway than to have them otherwise badly located. We sometimes see a barn and house located on a low, flat piece of ground near the highway, while a few hundred feet behind them is a high and dry location that would be ideal. Man desires company, and this accounts for the tendency to sacrifice many other things to the social advantages given by being near the public road.

IMPROVE THE MALE.

F. O. Welcome writes entertainingly as follows in Poultry:

As a broad generalization, it is ever true that the breeding male is half of the flock because he is the sire of every chick.

We all know that the brain is a dual organ and that one-half of it controls the opposite half of the body. If the right lobe of the brain be undeveloped or becomes injured, the left side of the body suffers. This fact somewhat crudely and insufficiently illustrates a peculiar fact in heredity. The particular traits of a father are often reproduced in a daughter to be transferred again to the male line in her son. We often notice that a woman's peculiar qualities are reproduced in one or more of her sons and one or more of his daughters. This cross transmission of parental qualities is not an unfailing rule, but it is quite common.

Many poultry breeders hold that the sons of a persistent layer are more likely to transmit the persistent laying qualities to their pullets than are her daughters.

A certain experiment station has for some years been selling their noble sons of 200-egg hens to farmers and other poultry keepers for the purpose of improving the laying qualities of their stocks. They receive many reports that indicate that the plan is effective. The work is worthy in every way, so far as the station is concerned, but the advertising that the poultry press gives them gratuitously in unfair competition with the paid advertising of worthy breeders who are breeding along the same lines at their own expense, should be severely condemned in behalf of justice and fair dealing.

The selection of a male bird for the breeding pen is a serious matter, whatever be the aims of the breeder. It is important that the qualities of the mother of that male be known so far as it is possible or practicable to know them. If we desire a male that will improve the laying qualities of our stock is it not pertinent to inquire if the dam of that male was a good layer? The male had but one dam, consequently the broad knowledge that the breeding flock as

Money Back

BE SURE AND WORK THE HORSE

We will refund the money if Bickmore's Gall Cure does not cure collar and saddle galls while the horse works.

Bickmore's Gall Cure

is guaranteed to cure all chaps, bruises, cuts, grease heel, scratches or torn or scratched teats, etc., in cows. Take no substitute. See trade mark. Every horse owner can have our illustrated Horse Book and large sample box Gall Cure for 10 cents for postage on both. Write today, or ask your dealer.

Bickmore Gall Cure Co.
Box 936
Old Town, Maine.

$665,000,000.00

Are invested in all the Building and Loan Associations in the United States. This is more than the capital of all the National Banks.

WHY IS THIS?

Because they are the safest investment in the world and pay the best interest on money deposited.

THE CONTINENTAL BUILDING & LOAN ASS'N

of San Francisco, is the largest in the United States and pays 6 per cent, payable semi-annually, on term deposits, 4 per cent on ordinary deposits, and from 5 to 6 per cent on monthly savings.

a whole averaged to lay well is no assurance that the male in question was not hatched from an egg laid by one of the poorest layers among them.

The mother of the breeding male is likely to transmit her own individual qualities, good or bad, through her son to many of his pullets. What about her?

THE COMBINATION SHEEP.

That our future wool supply must come largely from the mutton sheep is the opinion of Professor C. F. Curtiss of the Iowa Experiment Station. He thinks it is essential that a mutton sheep have a good fleece as well as a good carcass, for it is neither practical nor profitable to grow one sheep for fleece, another for carcass and another for lambs. The intelligent flockmaster combines them all in one class. Some of the best mutton sheep are producing as profitable fleeces as those kept exclusively for wool, and their lambs are decidedly superior. One of the first essentials in a good fleece is compactness or density. This quality not only insures a better yield of wool, but it affords better protection against storm and indicates a hardier animal, better able to withstand exposure. A close, dense, even fleece, with no breaks, should cover all parts of the body, including the head, limbs and under parts. The tendency in improvement of the wool-producing qualities of all modern breeds has been toward carrying the fleece more completely over the head, face, limbs and lower line. The advantage is not so much in the increased yield of wool grown on these parts (that is of little consequence), but in the accompanying tendency to a larger and better yield of wool in all parts. A barefaced and barelegged sheep is always a relatively light shearer, and in contrast with this the sheep wooled from the eyes to the toes always yields a heavy fleece, and the wool is generally of a better quality than from those having a scanty covering.

Fineness, length and strength of fiber are essential qualities in a good fleece that should always have prominent consideration in the selection of breeding stock, as these qualities largely determine the market value. Neglect or undue exposure of the flock, a period of sickness, or anything that induces unthrifty and impaired vitality invariably results in diminishing both the length and strength of fiber. Well-fed sheep always produce the most and best wool. Softness and pliancy of wool usually correspond in degree with fineness. Harshness and dryness are always detrimental to the quality, even if the fiber is otherwise good. As a rule this condition may be taken as an indication of poor breeding, although it may be due to disease, old age or improper treatment. Generally a fleece begins to decline in value and yield after a sheep becomes 4 years old. Softness and pliancy are to a considerable extent due to the secretions of the skin. A clear pink or yellowish skin is an indication of a good quality of wool, while a pale or bluish skin is generally accompanied by an inferior fleece. The yolk is the oily secretion which gives color, softness, pliancy and luster to the fleece. The composition of the yolk consists of a soap matter, principally animal oil and potash, which promotes the growth of the fleece and prevents friction, wearing of the fibers and cotting. Good feeding, shelter and care promote liberal secretion of yolk, while exposure and alkali soils result in injury to wool by diminishing the yolk. The secretions are always more abundant under high temperature, hence blanketing and confinement in close, warm quarters will stimulate the production and insure a finer fiber. A liberal secretion of yolk is favorable to the production of a good fleece, but the yolk should be clear and transparent and not too thick and gummy. In addition to these qualities a fleece should possess the properties of evenness and uniformity; this refers to covering, density and quality. A good fleece should be as nearly uniform in all parts as practicable.

The heavy harness horse is increasing in popularity and in market demand, and the better class of trotting-bred mares that have breeding and quality are being bred to the large, handsome Coach stallions producing colts that mature up to the highest prices with the demand unlimited.

AMERICAN FRUIT IN HOLLAND.

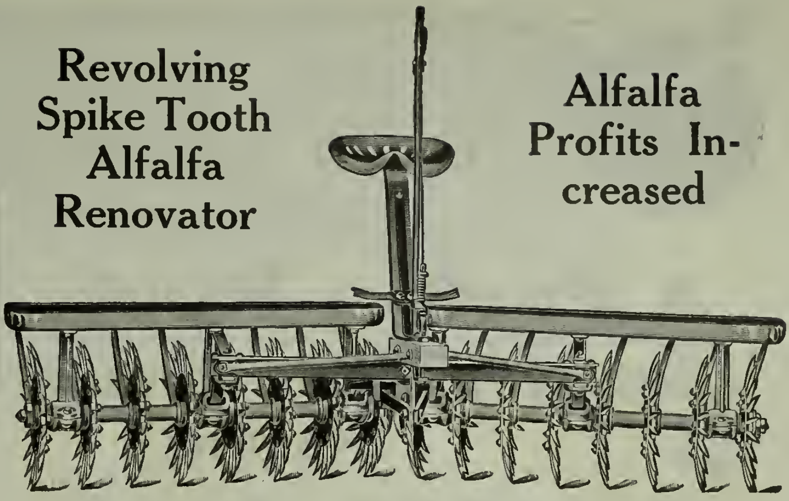
In a report from Amsterdam, Consul F. D. Hill makes the following statements in regard to American fruit in the Netherlands:

The prices for evaporated and dried apples were rather high in 1906, so that the trade was not as important as in former years with moderate prices. The crop proved to be rather small, so that in the second half of last year prices went up and reached such a high level that the trade bought only small quantities. Some American houses which had sold uncovered could not or would not execute their contracts. Others executed only the half, so that several importers here suffered serious losses. The trustworthy American exporters who seem also to have sold bearish to European consumption markets had to cover their sales in the stipulated contract time, so that the demand was much greater than the offers, and a further rise was the consequence. Prices for evaporated apples rose very high.

Prunes were moderate in price. The rise in French prunes influenced the California products, so that exporters there increased their quotations also. The crop for the larger sized fruits turned out smaller than anticipated. The difference between the small and large fruits was this season greater than usual. The crop of apricots was very small and prices high.

Revolving Spike Tooth Alfalfa Renovator

Alfalfa Profits Increased



Break your hardpan, separate old alfalfa stools, destroy weeds, pulverize clods and increase your profits. This modern tool will do it. Address Dept. **F**

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Your Baby or Children get Colds and CROUP at night

YOU SADDLE OR HITCH UP GET A DOCTOR---COSTS $5

Cut out this ad. and mail with 50c. and we will mail one box of Dennis Eucalyptus Ointment and Croup Cure. You will not have to run for a doctor the next time. Money returned if not satisfactory. Address:

Dennis Mfg. Co., Sutter Creek, Amador Co., Cal.

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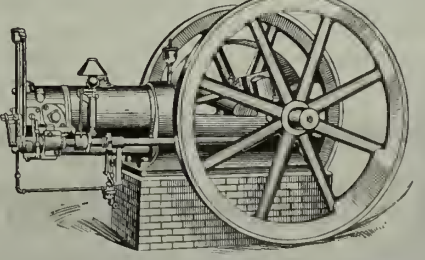

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Points Regarding Poultry Farming

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Is made in our own factories under the personal supervision of roofing experts, backed by a quarter of a century of roofing experience. We stand back of every foot sold, because we know we can "make good" every claim of its superiority.

That hard flint sand surface is wearproof and eliminates all paint expenses.

A complete roofing kit with every roll

Any man with a hammer, a knife and an old paint brush can lay it right.

Complete Roofing Guide sent free with samples and prices. Ask for it.

Let us put you in touch with our Agent in your locality.

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The Most Reliable Harness Manufacturers
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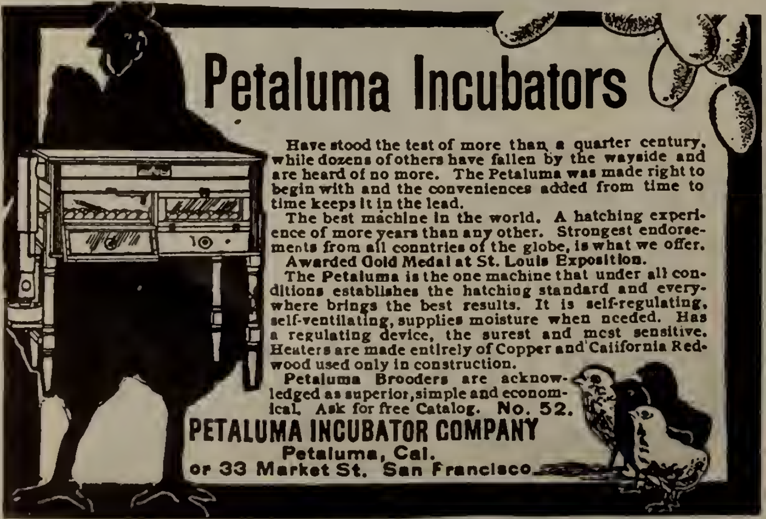


Petaluma Incubators

Have stood the test of more than a quarter century, while dozens of others have fallen by the wayside and are heard of no more. The Petaluma was made right to begin with and the conveniences added from time to time keeps it in the lead.

The best machine in the world. A hatching experience of more years than any other. Strongest endorsements from all countries of the globe, is what we offer.

Awarded Gold Medal at St. Louis Exposition.

The Petaluma is the one machine that under all conditions establishes the hatching standard and everywhere brings the best results. It is self-regulating, self-ventilating, supplies moisture when needed. Has a regulating device, the surest and most sensitive. Heaters are made entirely of Copper and California Redwood used only in construction.

Petaluma Brooders are acknowledged as superior, simple and economical. Ask for free Catalog. No. 52.

PETALUMA INCUBATOR COMPANY
Petaluma, Cal.
or 33 Market St. San Francisco

EGG-LAYING CONTEST.

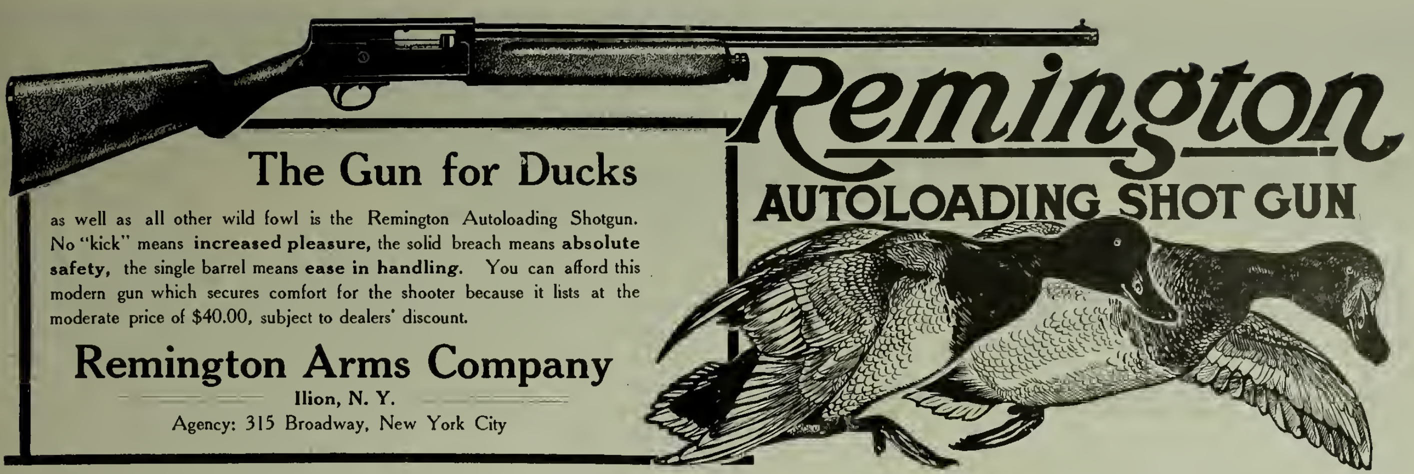
FROM our contemporary, The Australian Hen, says the Industrious Hen, it will be seen that at least ten egg-laying contests are now going on in that country. Five different breeds lead in five of the contests and one breed leads in three. Our English cousins have taken to these egg-laying contests very heartily. In this country they have not been very satisfactory. The best opinion now is that no contests can, or should be, considered final as to the merits of any breed or strain. A contest simply shows that a certain breed, or strain of that breed, under certain given conditions made the best egg record for a definite time. Another breed or strain would possibly make a better record under different conditions. However, more contests would serve to awaken more interest in developing the egg strain. Our Yankee shrewdness is being discounted by the English in these contests. The American instinct for anything that is practical and a dollar bringer is proverbial, but we are neglecting an opportunity to arouse interest in the egg-producing capacity by neglecting these egg contests. American buyers may be found sending to England or Australia soon for stock or eggs with egg-records, unless our poultrymen stem the tide Americanward. By this we do not mean that the English or Australian birds have better egg-records than our birds can make, but our cousins are simply showing to the world by contests what their birds can do. Like all wise advertisers the owners of the birds will soon reap their reward in good juicy orders. It is up to the American fanciers to do a little advertising themselves, although the contests as above stated are not final or proof-positive of an egg-producing strain. It's simply a case of advertising, the modern lever that moves the business world.

Jamestown Poultry.

Reports from the Jamestown Show, October 22d to November 1st, are favorable for a great gathering of the best in all kinds of fowls in America. The announcement of the list of judges is meeting with general approval and all the officials are good ones. Theodore Hewes, the veteran editor and genial good fellow, will be first assistant superintendent, and this means that the leading poultrymen over the country have a man connected with the show that is known personally to them. Superintendent Murkin has used good judgment in the selection of his assistants, every one of whom will lend an influence to the show that will draw crowds, and this is what we want. Hewes is frank, honest, and not afraid to "speak out in meeting" when things do not run to suit him or smoothly as they should. In the matter of building, the Jamestown show is peculiarly fortunate. Those who have wandered through a regular maze of buildings away off to the back side among the bushes of former poultry shows at great expositions will appreciate the fact that the Jamestown show will be held in the main Convention hall, just inside the main entrance, says the Industrious Hen. Again this means a great attraction to exhibitors, for immense crowds will stream through the poultry department all day long. A circular being sent out by the poultry department well says "the most desirable location in the grounds." Indeed it can be said that poultry is coming into its own when exposition folks put it to the front in the Convention hall at the main entrance. Being put next to the incoming crowd, before the visitors are tired sight-seeing, means an interested crowd and an interested crowd means business for the exhibitor. All these things taken together mean that the wise exhibitor will be on the grounds with his birds ready to win ribbons and, if he fails in that, still there to take orders and do business with an interested public. The World's Fair at St. Louis was a great show and it is a dangerous statement to say that any show soon will equal it in number of birds, but viewed from all points of vantage, Jamestown is certainly making a wonderfully strong bid to be known in the future as the greatest exhibit of poultry in modern times. See the illustrations on another page.

World's Most Famous Fowl.

The most famous fowls in the world are the Gallus Bankiva, the wild fowl of the East Indian jungles. They are the most famous of all our poultry, because they are the parent breed from which have sprung all the breeds of this genus on earth. We have now in this country one hundred and twenty-six breeds of this genus, such as the Plymouth Rocks, the Brown Leghorns, the Black Langshans, and all of them descended from the Gallus Bankiva. Some of the Gallus Bankiva were domesticated far back in the misty dawn of civilization, thousands of years ago. Some of them were taken to China and Japan, and from them were developed the remarkable fowls of those countries. Others were taken to Europe, and out of them came the myriad breeds of that part of the world. Now the breeds are scattered over the entire earth and are



The Gun for Ducks

as well as all other wild fowl is the Remington Autoloading Shotgun. No "kick" means **increased pleasure,** the solid breach means **absolute safety,** the single barrel means **ease in handling.** You can afford this modern gun which secures comfort for the shooter because it lists at the moderate price of $40.00, subject to dealers' discount.

Remington Arms Company
Ilion, N. Y.
Agency: 315 Broadway, New York City

found on all the large islands of the sea. Had it not been for the Gallus Bankiva we would not today have the breeds of fowls that have proved for centuries such a help in feeding the human race.

The Gallus Bankiva was in every sense a game fowl, having all the fighting qualities of the most savage breeds of modern game cocks. Such instincts were developed in the wild state in which the Bankivas existed for untold myriads of years. The modern breed that comes nearest to the original stock is the Black-red game, and this breed is supposed to have sprung directly from the Gallus Bankiva.

People naturally think of the game fowls as having been later developments from among the breeds, but they are the oldest group, without doubt, as they resemble most the parent breed.

Concerning Gapes.

That is the magic word that upsets the carefully laid chick plans of many a poultryman every year, says the Epitomist. This year seems to be only a repetition of former years, because for the past two or three weeks we have been receiving almost a deluge of inquiries upon this subject.

We don't know what causes gapes, nor do we know of anybody else that does. Some people claim they do, but their ideas are largely theoretical and will not work out in actual practice. We used to think we knew, but the greater the extent of our experience and observations the less we conclude we know about this matter.

A few years ago many people believed that lice caused gapes, but that idea is fast dying out because there is nothing in it. We never could quite see the connection between lice and gapes and are glad that the falsity of the statement has been established. Some of the lousiest chicks we ever saw did not have the semblance of gapes and some of the 'gapiest' chicks we ever saw did not have the semblance of a louse.

The idea that angle worms (more commonly known as "fishworms") cause gapes is still quite prevalent and has not been proven untrue although it is scarcely likely that there is much in it. That theory is not air slacked lime scattered quite free-

that the fishworms themselves cause the trouble as some people suppose, but that another small worm, a parasite of the fishworm and which lives on the latter's body, lodges in the chick's throat as it swallows the large worm and there multiplies and causes final disaster.

The best preventive we know of is

TWO PIANOS! CASH! BIG PRIZES FREE!

CAN YOU COUNT THESE DOTS?

SUCESSFUL FARMING WILL GIVE TO THOSE WHO CAN COUNT THE DOTS IN THE PIANO CORRECTLY OR NEAREST CORRECTLY, THE FOLLOWING LIST OF PRIZES: CAN YOU DO IT?

Two Elegant Pianos, one to a lady and one to a gentleman.
2nd. Two Hundred Dollars Cash.
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4th. Fifty Dollars Cash.
5th. Twenty-five Dollars Cash.
Next 5. Ten Dollars Each.
Next 10. Five Dollars Each.
Next 25. Two Dollars Each.

CONDITIONS: 50 cents pays for one year and one count. $1.00 pays for two years and three counts. You get $50 extra if you have three counts. It will pay you to have three. See conditions below.

DON'T DELAY!

IF YOU WANT A PIANO OR OTHER PRIZES FREE SEND YOUR COUNTS AT ONCE

PRIZE WINNERS IN PAST CONTESTS

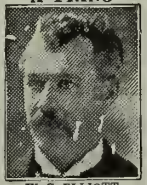
A PIANO

MRS. L. W. NOTT,
Marion, Iowa.

A Piano for $1.00. Surely people may enter your contests knowing that they will receive fair treatment. **How glad I was to win a piano for so small an** amount and wholly unexpected. The paper alone is worth all I paid.
MRS. L. W. NOTT, Marion, Ia.

He Won a Piano. Refer people to me if they want to know whether you are honest. **I got a piano for a prize and** never heard of you until I answered your ad. Your paper is worth twice the subscription price. W. C. ELLIOTT, Audubon, Iowa.

A PIANO



W. C. ELLIOTT,
Audubon, Ia.

$100.00 Prize. I got my $100 and it was the easiest I ever earned. The dots are hard to count but I know the prizes go to those who win them fairly.
AMY R. BARNES, Van Horn, Iowa.

Won $350 Cash. To Whom It May Concern: I won grand **prize of $350** Cash in last contest. I was much surprised. I want to vouch as to Successful Farming's fairness to any and everybody. JOHN A. GOODWIN, Richmond, Va.

$50.00 for Canada. Way up here in Canada **I won $50.** I never knew there was such a paper until I answered ad, now I will never be without it again. MISS E. FORNIER, Mantane, Quebec

$50.00 CASH

EUGENIE FOURNIER,
Matane, Quebec.

Won a Piano. I received the elegant piano which I won in your recent contest, and all was perfectly grand. I am recommending you to all my friends and you are at liberty to use my name as reference any time you wish. ISAAC SHOTWELL, Rockland, Ohio.

OTHERS WHO HAVE WON:

Pianos—Myra A. Fursman, Panola, Ill. E. L. Jones, 82 Cottage Ave., Ansonia, Conn. Mr. Libbie Greulick, St. Paul, Minn. W. S. Keever, 817 Freeman St., Cincinnati, O. J. Gemachlich, Kensington, Kan. Edith Hutchinson, Leonard, North Dakota.

$100 Eva I. Buckner, Fredonia, Kas. C. S. Wyman, Vinton, Iowa. E. M. Hall, Montrose, Mo. J. W. Smith, Rome, Okla.

$50 S. Irving Steyer, 225 E. Balt. Baltimore, Md. L. F. Stinson, Arcata, Calif. A. J. Perdue, Altoona, Ia. Albert ''eterson, Holdrege, Neb. Chas. McBride, Peoria, Ill. Jos. Unsor, Belleview, O. Mrs. D. H. Stoner, Granger, Ia.

THESE ARE BUT A FEW OF MANY. WE COULD GIVE A LIST OF HUNDREDS IF WE HAD SPACE. YOU MIGHT AS WELL BE A WINNER IF YOU GO AT IT AT ONCE.

If this chart gets destroyed another printed upon heavy paper will be sent upon receipt of 2c stamp for postage.

CONDITIONS—50 cents pays for a year's subscription to SUCCESSFUL FARMING and one count; $1.00 pays for two years and three counts and makes you eligible for the special $50.00 prizes given to winners of 1st prizes if they have three counts. See below.

AWARDS will be made as follows—The person giving correct or nearest correct count will get first prize. Next nearest second, etc.

$50 PRIZES—We believe everybody should have three counts so they can have one each side of what they think is correct to be more sure to hit it. To encourage this we will give $50.00 extra to winners of 1st prizes if they have three counts. Remember if you have one count you get piano only, but if you have three counts you get $50 extra.

TIME PRIZES—**$25.00 Extra.** We feel early counters should be rewarded and we will give $25.00 to the person sending best answers by Feb. 28th.

OUR RESPONSIBILITY—We are a responsible business house, and every prize must be and will be paid as stated. We refer to Iowa National Bank, Central State Bank, German Savings Bank; in fact any Bank, Express Company, business house or individual in Des Moines, as well as Dun or Bradstreets Agency, or the publisher of this paper.

JUDGES—We have wholly disinterested judges to award prizes. Here is what they say:

TO WHOM IT MAY CONCERN: We have been asked by the publishers of SUCCESSFUL FARMING to act as judges in their contest and see that prizes are all awarded fairly. This we will gladly do guaranteeing each contestant absolute fair treatment. Signed—W. W, MORROW, Treasurer State of Iowa; HUGH BRENNAN, Judge District Court; Rev. A. J. WILLIAMS.

In case of tie we will write each person so tied asking them to make as few words as possible from the letters of the alphabet, using each letter of the alphabet twice and only twice, and no one word more than once, each letter left over counting as one word. To the one tied in the counting who gives us the fewest words as above will be awarded first prize. This practically eliminates all question of tie, but if there should by any possibility be a tie in this the prize will be divided equally between those so tieing.

Subscription without counts is 25 cents per year, additional counts after you have three entered as per our terms in paragraph "condition" above may be entered at 25 cents each.

This contest is not to be confused with the guessing or estimating contests. Our contest is a test of skill in planning and counting and the best man wins. Nobody connected with our paper will be allowed to compete. Contest closes June 30, but get your counts in at once. See about time prize above.

Publisher SUCCESSFUL FARMING, 296 Tenth St., Des Moines, Iowa.

I enclose $................ for subscription to SUCCESSFUL FARMING,

and I wish to enter the..................(write ladies' or gents') Contest. If $1.00 is paid send three counts; if only 50c is paid send ONLY ONE count. The extra $50.00 go only to those having THREE or more counts entered.

My Count is: (1)..............(2)................(3)................

NAME.. ....

P. O.................................. State...................

Address all letters to SUCCESSFUL FARMING, 296 Tenth, St.. Des Moines, Iowa.

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Coulson's Improved
Mash Egg Food
FOR LAYING HENS

It is nearly as cheap as wheat and will make your hens lay, when prices of eggs are high. : : : :

If you cannot get it from your dealer write to us and we will give you the name of our nearest agent.

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FRESNO COUNTY
THE SUNNY LAND OF THE RAISIN.

The heart of the San Joaquin Valley, its richest and most developed portion, its industrial and commercial center, its greatest irrigated region and its district fullest of opportunities, invites all seekers after prosperous life and pleasant homes in California. Send for information to or see the responsible people whose cards appear here, or address the Chamber of Commerce, Fresno.

FRESNO COUNTY ABSTRACT CO.
Incorporated under the laws of the State of California, January 1, 1891
Capital Stock $1,000,000 Fully Paid Up.
Prospective purchasers of farm and residence property should always procure an abstract of title to satisfy themselves that the title is perfect. All abstracts to be of any value should be prepared by a firm or corporation having good financial standing to protect purchasers from loss by reason of any error in searching. This corporation employs the most experienced and accurate searchers, and also has sound financial backing.
No. 1117 K St., Fresno, Cal.

air-slacked lime scattered quite freely about the coops and runs, although any good disinfectant will help. We never do anything particularly to prevent gapes and never are troubled with them. Of course we keep everything sweet and clean, both coops and runs as well as the chicks' feed and water, but we do that to promote the general health of the birds and not prevent gapes, although that probably has considerable effect on keeping away all kinds of disease. Our chicks get all the fishworms they themselves can find or we can find for them, but no gapes result.

For this as well as all other serious poultry diseases, we are firm believers in the advisibality of the use of the hatchet in preference to any other remedy. As a rule, it doesn't pay to monkey with a sick chicken. If you do so you are running a big risk of having your other birds get ill with the same trouble and the probabilities are that you will also lose the bird you are doctoring.

The secret of the whole matter is to get the chicks freed from the gape worm. Removing them with a horsehair or something similar is an old practice, but a good one nevertheless in the hands of an expert operator, although it is purely a relief and not a cure. Single-banded it would scarcely be an efficient enough remedy, but in conjunction with other preventives good results ought to be obtained.

Spirits of camphor in the drinking water often helps a good bit. A little turpentine and coal oil mixed with a mush or applied to a feather and twisted in the chick's throat, is also good. In addition to these there are quite a number of prepared gape cures on the market, which are about as efficient as anything one can get hold of and they do away with much of the bother and trouble that always accompanies the use of home remedies.

Many people place a great deal of confidence in the use of air slacked lime to cure the disease as well as to prevent it. The afflicted chicks are confined in a small box and the lime is allowed to filter down over them through a piece of coarse cloth. This causes the chicks to sneeze quite freely and as a consequence many of the worms are coughed out by the birds.

The raising of broilers may be regarded as one of the specialties of the poultry business and does not appeal particularly to the farmer, but it can often be made a paying occupation in connection with an egg farm or as a winter employment for those whose regular occupation gives them plenty of leisure at that season. Great skill is required to bring this work to its highest perfection, and any one contemplating the production of broilers on an extensive scale should not depend on written directions for his guidance, but should make a careful study of the market demands and should visit one of the successful broiler producers, for the practical experience of such men is the safest guide.

Broilers are young, plump chickens, weighing, when dressed, from three-quarters of a pound to two pounds, and are usually killed when from six to twelve weeks old. The name is derived from the fact that they are usually split down the middle and the halves broiled. The market demand today is for broilers of three sizes—squab broilers, small broilers and large broilers. Squab broilers when dressed weigh from three-quarters of a pound to one pound each; small broilers, the size most in demand the greater part of the year, weigh one to one and one-quarter pounds each, and large broilers from one and one-half to two pounds each. In most American markets a yellow-skinned and yellow-legged bird is preferred, but this is not of as much importance as good quality of meat. The raising of broiler chickens until the finishing period is reached is practically the same as the raising of chickens for other purposes. The main point is to keep them growing rapidly.

To Finish Broilers for Market—A fat broiler is quite a rarity; the best that can be done, in general, is to have it plump, for the natural tendency of the chick is to use all nutriment for growth and development. When the birds are nearly large enough for the market they should be given all the fattening feed they will eat, and for this purpose corn in various forms should be fed freely. They will digest more feed if fed ground than if whole or cracked. A moistened mash consisting of about two-thirds corn meal and one-third bran by bulk is good. Cooked potatoes are good, and milk, with a little sugar added, will hasten fattening. Broilers may be sold alive or dressed according to the discretion of the grower. If dressed this should be done according to the demands of the market to which they are to be shipped.

Keep Your Profits
Save those sneezing, wheezing, moping, swollen-headed fowls with
CONKEY'S ROUP CURE
It kills the disease germs, tones the bird, and restores your profits. It is given in the drinking water without trouble, and is used in every civilized country of the world as the standard. Absolutely Guaranteed—AGENTS WANTED EVERYWHERE. Prices 50c and $1.00 postpaid. 50c size makes 25 gallons of medicine.
CONKEY'S CELEBRATED 48-PAGE BOOK ON POULTRY
tells every practical point of the business. GET IT FREE TODAY for 4c in stamps and names of two others interested.
THE G. E. CONKEY CO.
10 OTTAWA BLDG., CLEVELAND, O.

Concerning Bees and Beekeeping

PROFIT IN BEES.

A. L. Boyden writes a long article on the question of profit in bees. He says in part:

Beekeeping can not be very well compared with the oil business, banking, stockbroking or other great money making vocations. It may be confidently asserted, however, where profit and pleasure are happily and healthfully blended, beekeeping carries away the laurel wreath, and this is the spirit in which the subject ought to be approached.

Few people make beekeeping their sole business. A good many combine it with fruit culture and poultry rearing, and this is a very wise procedure. Clerks, clergymen, doctors and people of their class choose beekeeping by preference as a nice outdoor avocation. Beekeeping is different from many hobbies in that it sometimes realizes a handsome profit even in the hands of an amateur, and very often this forms a very acceptable addition to a slender income. No better avocation has ever been suggested for women, since it compels them to wander out of doors and the work is excellent physical exercise, neither too heavy for their strength nor too light to be useless. Some housekeepers care for the bees to enable them to supply a delicate, palatable food for their own tables which they could probably not afford to purchase otherwise. Families living in the suburbs of our great cities can adopt this course with excellent results, and quite a number are actually engaged in it already.

There are instances of beekeepers amassing considerable means by their beekeeping operations. The late Adam Grimm of Wisconsin, a celebrated beekeeper, amassed sufficient funds to start a bank with the results of the bees' labor. The late Captain Hetherington of New York state did equally well, but in another way. Where a person is desirous of following the beekeeping business as a life vocation it would be better to go to favored localities, such as Southwest Texas, California and the irrigated regions of the Rockies and there learn the business from A to Z before investing capital in it. Even in these favored localities beekeepers find it advisable to add a fruit garden or poultry yard to their bee business.

Healthful Vocation.

For a person with weak lungs agriculture in the West is an almost ideal occupation and in many instances is almost the only occupation one can follow in the great wilds. In the lovely canyons of the Golden West can be frequently seen large apiaries, guarded by a lonely bachelor in a rude shack, patiently awaiting a good honey season to recuperate a depleted bank account before making a long looked for visit to the ''old folks'' back East. At present he is ''lost to sight and memory dear.''

The probability of the industry of beekeeping continuing to improve is very great. The new national pure food law, recently passed by Congress, will give consumers far greater confidence in the products of the apiary. A certain class of ''yellow'' journals have taken a sort of delight in maligning the beekeeping industry of the United States, with the net result that the price of honey has been greatly depressed thereby. At present honey can be sold at retail in gallon lots for about ten cents per pound, whereas butter, which is actually not quite equal to honey in dietetic value, sells for about three times that sum. Were honey to rise to the price of butter—which it ought to do—then beekeeping would be certainly a very profitable little industry for many.

Where the beekeeper is located in a section where there is quite a population of working people employed in factories and workshops, there exists an excellent opportunity for obtaining fair prices for all honey sold direct to the consumer. Beekeepers are immensely pleased with the Hepburn pure food law and confidently hope it will prove a great boon to them, because under its provisions the consumer is made to feel what is bought in the open market is pure. Our American honey is probably the best food for humans money can buy—then why should it not sell for fair prices, and already there is noticeable stiffening in prices, though the Hepburn bill is not yet

SUGAR - - - 2c
FLOUR - - 2c
POTATOES - - 1c

We sell at these prices to compel introduction to our "quality groceries." ONE ORDER ONLY TO ONE FAMILY. Call for Combination Order No. 87 O & F. Every item guaranteed or money back. Notice immense saving in each one. Good till Dec. 2d.

25 lbs. Pure Cane Granulated Sugar at 2c........	.50
25 lbs. Fancy Burbank Potatoes at 1c................	.25
50 lbs. fancy roller, best California Flour at 2c......	$1.00
6 tins solid Tomatoes, small size	.30
1 jar French Mustard, Jumbo	.25
3 large or 6 small cartons of Egg Noodles, Macaroni, Vermicelli	.25
1 quart bottle pure S. C. S. Olive Oil, worth $1.00; or 2 lbs Fidelity Pure Baking Powder	.80
I dozen fancy Lemons......	.20
3 packages fine Corn Starch	.25
5-lh. wood caddy new crop Tea, just arrived, better than ever before, packed in the Orient for our best family trade, guaranteed equal to any you pay 75c lb. for otherwise; Japan, Young Hyson, Green, Uncolored, Spider Leg, Oolong or English Breakfast, per lb. only 50c.	$2.50

Option—You can take 8 lbs. roast 40-cent Coffee in place of Tea, or 4 lbs. Coffee and 2½ lbs. Tea in bulk.

Total for all unchanged....$6.30

SPECIALS ALL THIS MONTH.

Our 50c Family Mixed Tea (limit 5 lbs)..............	35c
35c value English Breakfast Tea	16c
Campbell or Colonial Soups 3 for	25c
Santa Claus, Clairette or Silk Soap, 10 for	35c
New pack Tomatoes, 3 tins for	25c
Pearl Barley, lb.............	5c
Macaroni, Short Cut, 4 lbs...	25c
Rice, table, clean, good lb..	5c
Ground Chocolate, 3-lb. tin..	69c
Corn, choice, this year's pack, tin	9c

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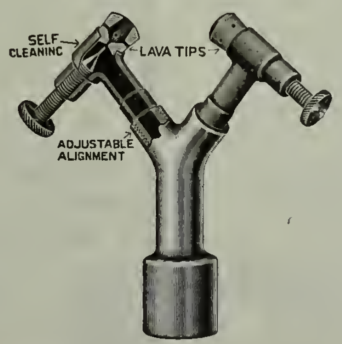

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The body of the burner will last as long as your gas fixture, and is made of the same material. If you keep on hand a supply of extra Tips and a pair of our Special Pliers when necessary you can break out the old tip and put in a new one and by turning the impinging flames into alignment, make a new burner in a moment's time, and at a cost of 5c. Otherwise (if of any other make) you would be compelled to discard the whole burner and purchase a new one at a cost of 25c. to 50c. each, and not have as good a burner in the end.

Our Circular will tell you all about it. Address

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in force. That beekeeping is profitable is undoubted, but it is not one of those industries which one can blunder into without previous experience—nor is it one of those pursuits one may jump right into because one has a taste for it and the capital is forthcoming to start on a large scale. One may be able to manage very successfully a small apiary and yet be unable to manage a large one—a point one is often unable to see. It is therefore very important for me to suggest to every beginner the propriety of starting in a small way and allowing the business to grow. Properly cared for and attended an apiary doubles itself every year, which is quite fast enough to suit the most of us, but not fast enough for some in this hustling age. Experience will accumulate in nearly the same ratio as the apiary. Where one starts with four hives in six years the apiary will have 256 stands of bees if the foregoing ratio is maintained—and it can be. It requires an expert beeman to manipulate 256 stands successfully, and where the product is sold at retail locally the apiarist will only succeed by performing some hustling.

It not infrequently happens that a beekeeper secures a crop which sells for as much as the entire value of the apiary. This is quite likely to turn any man or woman topsy-turvy and usually it results in the beekeeper sinking more money in the business, but that is poor policy. Better bank the money at 4 per cent interest and wait for developments. I know most people will pay no heed to this warning, but in the general interest it ought to be made. Profitable beekeeping is the result of a sure, steady growth, and to double one's business annually seems fast enough for anybody—but it does not seem to be. So let the business grow. Use no hothouse methods. Sometimes one will get honey enough from one hive to pay for five hives exactly like it, but do not let that turn your head either. Keep the even tenor of your way and grow in agricultural wisdom with the business. Rockefellerism has no place in beekeeping.

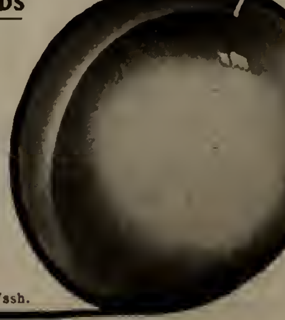
Where the desire exists to supply a profitable addition to some already established industry, such as fruit culture or aviculture, the chances for successful work in apiculture are increased and the person deeply interested in these pursuits is very likely to make a success of bees, because the principles which lead to success in either are practically the same—taste for rural life, love of outdoor work, and an ability to create and dispose of very nice food products.

Where Profits Arise.

Just where beekeeping is most profit is hard to say. Quite likely the locality the reader resides in—provided you know enough. It is the "man behind the gun" who does the execution. Every place has its drawbacks, and so has yours, and it is rather difficult to strike a balance. One may have a splendid location for bees and yet the locality is poor for beekeeping because the price of honey is low. Generally speaking things even up, though there may be some localities that are really poor, but a place too poor to keep bees is likely to be poor for all else. Some of the so-called deserts of the West are excellent for bees and where reinforced by large expanses of alfalfa, beekeeping is truly profitable, besides being very pleasant. In some parts of the South, notably near the center of the manufacturing population, the climate allows us to combine fruit culture, bee and poultry culture in perfect blend, and keeping in this kind of agriculture the progress of population has been more rapid than the development.

As to climates, profitable beekeeping exists clear around the earth and from the Arctic Circle to the Equator, and the "busy" bee is just as busy in one climate as another. Beekeeping is actually pursued on the Equator and at Hammerfest in Norway, where in summer it is always day and in winter prolonged moonlight.

Few businesses have suffered so much from the jibes and jeers of the American newspapers—even the honey bee has been systematically deprived of its good name. Periodically the story goes its rounds that the honey bee, when transported to the tropics, loses all its industrious virtues and becomes slothful in business. As a matter of fact the honey bee is a tropical animal and all its habits and instincts indicate this to be so and its acquisitiveness is simply the result of a native instinct to provide food for its young in the proverbial rainy day. In the tropics therefore, beekeeping is quite profitable, and in some instances the yield of honey is immense, as much as on thousand pounds from one colony o bees in one year. For the revers case we may look to Canada, wher beekeeping is quite profitably pur sued and where a very considerabl sum is actually invested in bees. Prob ably when the Canadian governmen gets its railway to the shores of Huc son Bay we shall see apiaries estal lished in that region, where the f mous willow-herb grows in vast pr fusion, yielding a honey second t none in purity and flavor. As it i beekeeping is profitably pursued



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We are growers and importers and pride ourselves on the quality and size of the stocks we send out.

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cars--Dining service the best--
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far north as Saskatchewan and Northern Alberta. What a wonderful creature, therefore, must be the honey bee, so industrious and so adaptable withal.

Where Keepers Loose.

The most unprofitable place to keep bees is hard by a large wide river, a mile or more wide, or near a lake, sound, creek or arm of the sea. In such situations not only do the bees secure nothing from the water, but large numbers in trying to pass to the other side get drowned in the attempt. Bees can be successfully kept near the ocean, as they make no effort to cross it, but of course the area of flowers is just cut in half. Seacoast plants usually secrete honey, however, so there is always a fighting chance for the beekeeper. Game preserves are excellent for bees; so are large parks and cemeteries. Wild lands, worthless for all agricultural purposes, are frequently quite good for bees. Forest preserves are excellent as a rule and a would-be beekeeper on a large scale would do well to get near one, provided the move does not entail too much expense. Sometimes fishing and hunting can be very nicely combined with beekeeping, for in a wild country the bee is in its element, sipping at almost every wild flower.

Dairying makes a good combination with beekeeping, provided legume crops are grown to feed the cows, and the best authorities are agreed that clovers, vetches, peas, beans and similar plants should be more generally grown than at present.

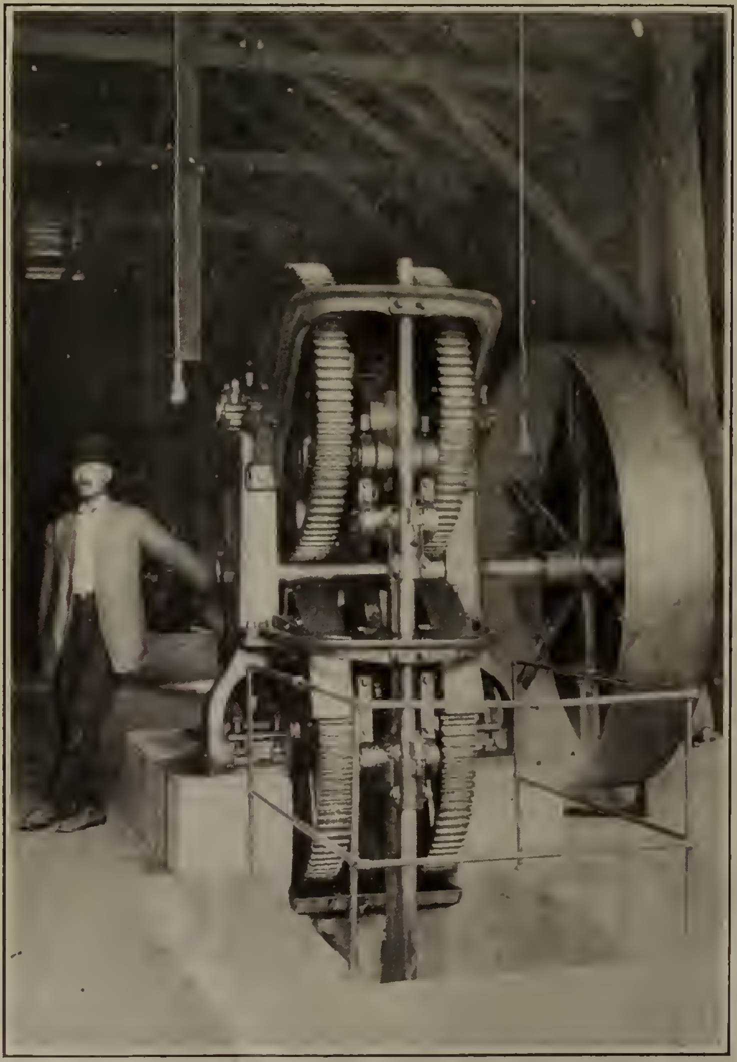
Even in the midst of great cities, as Chicago, New York, London, Paris and Berlin, beekeeping is profitably followed. The writer knows something of this feature, for he kept bees on a New York roof, and realized $10 per hive for the honey obtained; nearly all secured from the linden and tulip trees planted for ornament and shade.

Sifted down to the last analysis beekeeping is profitable almost anywhere, provided one uses the right methods, the right appliances, and is industrious besides; mayhap a little "brains" is required. It is not a business for the uneducated and unlettered, neither is it suited to the man who depends on his books entirely for his information. Some imagine the bees do all the work, which is a huge mistake, and if left to themselves, bees store up but little of a surplus. Keen observation is greatly required in a successful beekeeper. Books can not be depended on to tell us what we want to know about, and much will depend on the observing powers, supported by good, all-round common sense, of which all good men and true are supposed to have a stock on hand. Stick-to-itiveness is a very necessary ingredient in profitable beekeeping. It takes faith and knowledge of oneself to tide past an unprofitable season, when all the elements seem to conspire against us.

CANNING TOMATOES.

Cans, covers and rubbers must be thoroughly sterilized, and for this strong soda water is best. A granite or porcelain kettle should be used, and cans and covers should be hot. Select fair not over-ripe tomatoes and with a sharp-pointed knife cut out the hard substance of the stem end. Be sure to remove all of it, for this is one of the secrets of success in tomato canning. Now drop the tomatoes into scalding water and leave them until the skin cracks, then lift them out into cold water with a wire dipper. Drop a few more into the hot water to scald while the others are being peeled. This is a quick and easy way of peeling the fruit. If the tomatoes are not all of one size, cut the largest in two. Place over the fire in their own liquid and add enough salt to make them palatable. Scald until thoroughly heated through, but do not cook until soft and mushy. When the fruit is heated through fill the cans, adjust the rubbers and screw down the covers as tightly as possible and turn the cans top down until cold. This effectually seals them from the air and they are warranted to keep. Chili sauce and catsup can be made of canned tomatoes as wanted for use. Very often we slice an onion into the tomato while cooking, as onion and tomato cooked together are much liked by members of our family.—The July Housekeeper.

Chicago's success in finally settling her traction problem should encourage New York to try to save the subway. It's a fine hole in the ground.



The New Pomona Pump

The past season has demonstrated more fully than ever the excellence of the New Pomona Pump, for City or Town Water Supply, Irrigation or Mining Purposes. Its ability to take the water out of a well or shaft any depth below the surface and force it through long pipe lines whenever necessary with one operation and without any pounding or hammering on the pipe lines or jerk or jar on the machinery makes it a most valuable machine.

The following letter and photo describes one of the many such plants we have in successful operation:

Pomona Mfg. Co. Riverside, Cal., Oct. 8, 1907
Pomona, Calif.
Gentlemen:

In reply to yours requesting privilege of photographing our pumping plant which you installed for us last spring will say, you are perfectly welcome to take as many photos as you wish and as our season of pumping is practically over it may be of interest to you to know something of what we have been doing with it. We have raised forty inches of water about two hundred and fifty feet, delivering it through a six inch pipe line to our reservoir about one and one half miles distant from the well. The pump is driven by a forty horse power electric motor, and our tests have shown the actual horse power used to be twenty seven horse power. The pump has worked perfectly all through the season and is in perfect condition today. It has come up to all that you represented it and met our every expectation. Should you wish to refer to our plant at any time you will always find it open for your inspection.

Yours truly,
Riverside Artesia Water Co.
By Geo. H. Kelsey, Supt.

The man standing by this pump is the engineer. Look at the satisfied look. If you are going to own a plant wouldn't you like to be like him. If so, send for a catalog and describe your proposition.

POMONA MANUFACTURING COMPANY,
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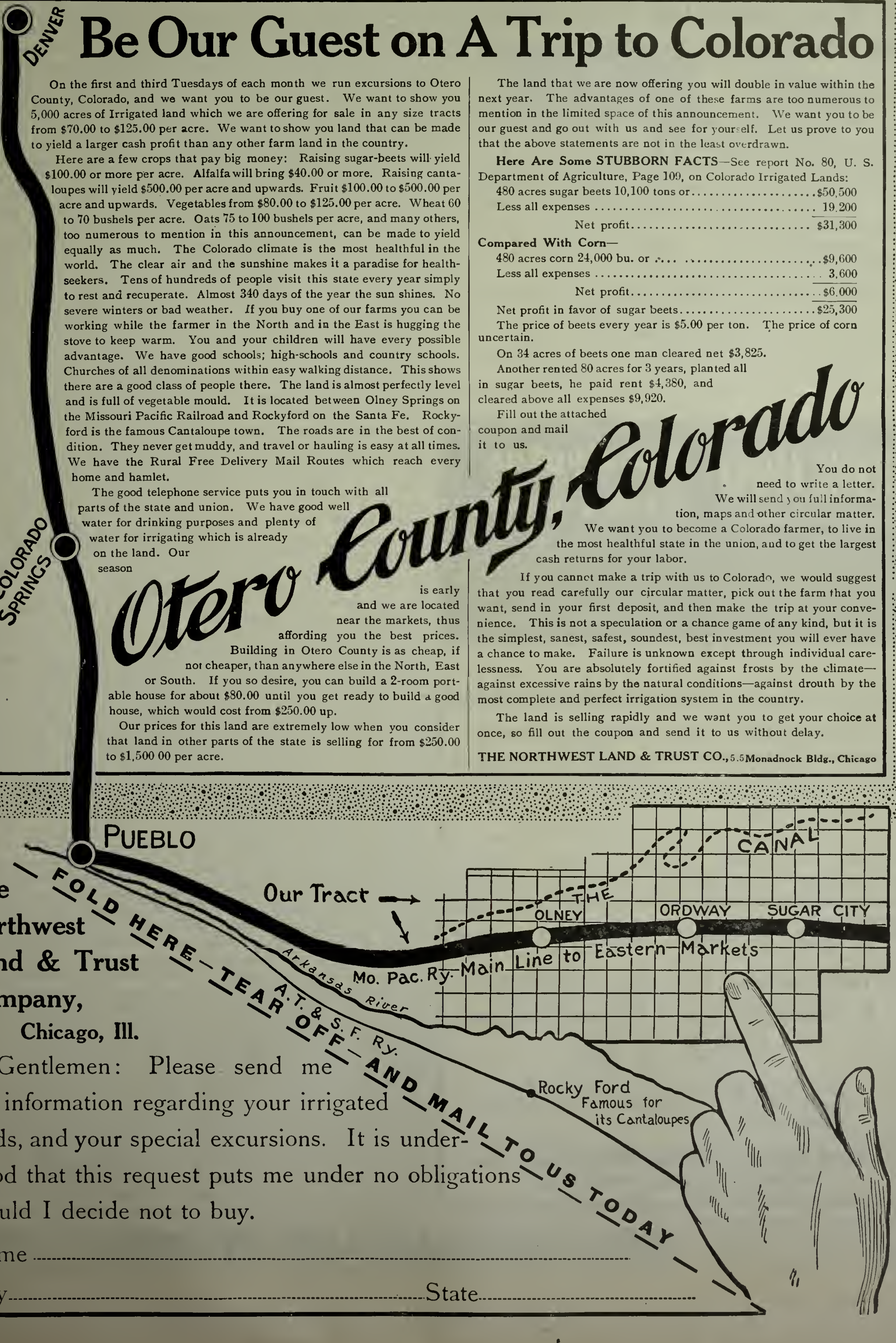
DON'T BUY A PUMP WITHOUT CONSULTING CALIFORNIA HYDRAULIC ENGINEERING & SUPPLY CO., SAN FRANCISCO

Be Our Guest on A Trip to Colorado



On the first and third Tuesdays of each month we run excursions to Otero County, Colorado, and we want you to be our guest. We want to show you 5,000 acres of Irrigated land which we are offering for sale in any size tracts from $70.00 to $125.00 per acre. We want to show you land that can be made to yield a larger cash profit than any other farm land in the country.

Here are a few crops that pay big money: Raising sugar-beets will yield $100.00 or more per acre. Alfalfa will bring $40.00 or more. Raising cantaloupes will yield $500.00 per acre and upwards. Fruit $100.00 to $500.00 per acre and upwards. Vegetables from $80.00 to $125.00 per acre. Wheat 60 to 70 bushels per acre. Oats 75 to 100 bushels per acre, and many others, too numerous to mention in this announcement, can be made to yield equally as much. The Colorado climate is the most healthful in the world. The clear air and the sunshine makes it a paradise for health-seekers. Tens of hundreds of people visit this state every year simply to rest and recuperate. Almost 340 days of the year the sun shines. No severe winters or bad weather. If you buy one of our farms you can be working while the farmer in the North and in the East is hugging the stove to keep warm. You and your children will have every possible advantage. We have good schools; high-schools and country schools. Churches of all denominations within easy walking distance. This shows there are a good class of people there. The land is almost perfectly level and is full of vegetable mould. It is located between Olney Springs on the Missouri Pacific Railroad and Rockyford on the Santa Fe. Rockyford is the famous Cantaloupe town. The roads are in the best of condition. They never get muddy, and travel or hauling is easy at all times. We have the Rural Free Delivery Mail Routes which reach every home and hamlet.

The good telephone service puts you in touch with all parts of the state and union. We have good well water for drinking purposes and plenty of water for irrigating which is already on the land. Our season is early and we are located near the markets, thus affording you the best prices.

Otero County, Colorado

Building in Otero County is as cheap, if not cheaper, than anywhere else in the North, East or South. If you so desire, you can build a 2-room portable house for about $80.00 until you get ready to build a good house, which would cost from $250.00 up.

Our prices for this land are extremely low when you consider that land in other parts of the state is selling for from $250.00 to $1,500 00 per acre.

The land that we are now offering you will double in value within the next year. The advantages of one of these farms are too numerous to mention in the limited space of this announcement. We want you to be our guest and go out with us and see for yourself. Let us prove to you that the above statements are not in the least overdrawn.

Here Are Some STUBBORN FACTS—See report No. 80, U. S. Department of Agriculture, Page 109, on Colorado Irrigated Lands:

480 acres sugar beets 10,100 tons or	$50,500
Less all expenses	19,200
Net profit	$31,300
Compared With Corn—	
480 acres corn 24,000 bu. or	$9,600
Less all expenses	3,600
Net profit	$6,000
Net profit in favor of sugar beets	$25,300

The price of beets every year is $5.00 per ton. The price of corn uncertain.

On 34 acres of beets one man cleared net $3,825.

Another rented 80 acres for 3 years, planted all in sugar beets, he paid rent $4,380, and cleared above all expenses $9,920.

Fill out the attached coupon and mail it to us.

You do not need to write a letter. We will send you full information, maps and other circular matter.

We want you to become a Colorado farmer, to live in the most healthful state in the union, and to get the largest cash returns for your labor.

If you cannot make a trip with us to Colorado, we would suggest that you read carefully our circular matter, pick out the farm that you want, send in your first deposit, and then make the trip at your convenience. This is not a speculation or a chance game of any kind, but it is the simplest, sanest, safest, soundest, best investment you will ever have a chance to make. Failure is unknown except through individual carelessness. You are absolutely fortified against frosts by the climate—against excessive rains by the natural conditions—against drouth by the most complete and perfect irrigation system in the country.

The land is selling rapidly and we want you to get your choice at once, so fill out the coupon and send it to us without delay.

THE NORTHWEST LAND & TRUST CO., 5.5 **Monadnock Bldg., Chicago**

545

The Northwest Land & Trust Company,
Chicago, Ill.

FOLD HERE—TEAR OFF—AND MAIL TO US TODAY

Gentlemen: Please send me full information regarding your irrigated lands, and your special excursions. It is understood that this request puts me under no obligations should I decide not to buy.

Name ....

City .... State ....

The roofing that makes you forget you have a roof is Gen-aś-co.

No leaks; no troubles from cracking, rusting, and rotting, as you have with coal-tar, tin, and shingle roofs.

Gen-as'-co Ready Roofing has the permanent waterproofing qualities of Trinidad Lake Asphalt sealed within it.

Put Gen-as'-co on all your buildings if you want a lasting, economical roof.

Any handy man can lay it. Nails and cement in each roll. Ask your dealer. Write for samples and Book 23.

THE BARBER ASPHALT PAVING COMPANY
Largest producers of asphalt in the world
PHILADELPHIA.
New York San Francisco Chicago

200,000 Eucalyptus Trees (In Variety)

Transplanted in flats of 100 each. We prefer orders of 1000 rather than 10,000; outside limit, 20,000. Our trees are up to our usual standard. We invite correspondence. Our booklet, telling when, how and what to plant, free to our patrons only. Address

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Fine Fluff Rugs made from your old carpets. Send for circulars. Geo. Matthew, 709 Fifth St., Oakland, Cal.

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Engines for Small Power Purposes
WE SELL THE BEST

We can design your complete plant so that everything will fit together and work properly when it arrives.

Cassel Power & Mine Machinery Co.
65 Maynard Building, Seattle, Wash.

PRESERVING EGGS.

The Vaseline Method.—Simplest of all methods of preserving eggs is that of coating with vaseline. Daub a little vaseline all over the egg, being careful to cover every part, then keep it in a cool place. It will keep for months in good condition, and come out nearly as good as new-laid. Or warm the vaseline until liquid and roll the egg around in it, being sure every spot of the shell has been touched by the oil. A 5-cent bottle of vaseline will coat at least five dozen and probably more eggs. We have had good success with this method, and practiced it until we found the newer water-glass method, which we prefer. That method has been fully described in these columns at various times.

Keeping in Dry Salt.—Put a layer of eggs in a stone crock. Cover with dry salt. Add another layer of eggs, and again cover with salt, and thus continue. Have plenty of dry salt on top, and store in a cool, dry place. Eggs thus put down will keep for three months, losing little of their freshness. None but strictly fresh eggs should be used for this or any other method of preserving eggs.

The Liming Method.—Preserving eggs in lime has been practiced for many years on a commercial scale. The proportions are one peck of the very best lime, two quarts of clean salt, and thirty or thirty-two quarts of pure water. This will make liquid enough for seventy-five dozen eggs. An expert gives the following directions for making the pickle: "Slake the lime with a portion of the water, then add the balance of the water and the salt. Stir well three or four times at intervals, and then let it stand until well settled and cold. Either dip or draw off the clear pickle into the cask or vat in which it is intended to preserve the eggs. When the cask or vat is filled to a depth of fifteen or eighteen inches, begin to put in the eggs, and when they lie, say about one foot deep, spread around over them some pickle that is a little milky in appearance, made so by stirring up some of the very light lime particles that settle last, and continue doing this as each is to have fine lime particles drawn into the pores of the shells, as they will be by a kind of inductive process, and thereby completely seal the eggs. Care should be taken not to get too much of the lime in—that is, not enough to settle and stick to the shells of the eggs, and render them difficult to clean when taken out. When the eggs are within four inches of the top of the cask or vat, cover them with factory cloth, and spread on two or three inches of the lime that settles in making the pickle, and it is of the greatest importance that the pickle be kept continually up over this lime. A tin basin (holding about six to eight dozen eggs), punched quite full of inch holes, edge muffled with leather, and a suitable handle about three feet long attached, will be found convenient for putting the eggs into the pickle. Fill the basin with eggs, put both under the pickle and turn the eggs out, they will go to the bottom, without breaking." When ready to market, take the eggs out of the pickle, clean, dry and pack. Another method is given as follows: "Fill a barrel, large stone jar or other receptacle half full of water, and add one-half pound of slaked lime and one-half pound of salt for each pail of water. Let the eggs settle to the bottom, small end down. In this and the first formula the limy taste which comes from long storage may be avoided by rubbing the eggs with lard before putting in the pickle."

Other Methods.—There are various other methods that are practiced by poultrymen in Europe, such as dipping the egg for five seconds in boiling water containing one pound of brown sugar to the quart, then packing in dry bran, or by dipping them in melted bees-wax and packing them in powdered charcoal, et cetera, but none of these methods seem to have any practical value for us when we have so much better ones in the water-glass, lime and vaseline methods, and especially in the cold storage process now so extensively practiced.

$5,125 For a Poland China.

The recent pure bred hog sale near Eldon, Missouri, at the Goodrich farm, was a record breaker. The boar pig "Tenstrike" was sold to B. M. Chambers, of Oswego, Kansas, for $5,125 and a litter of six pigs sold at $13,060. Forty-four pigs sold for $25,160, an average of $585 each. The breeding and blood were very fine, of course, but such prices show what confidence in the future there is in hogs. Breeders were there from several states.

Horticulture means the science of caring for things grown in the garden. This is the original signification coming from the Latin word hortus, a garden. At the present time it includes in general acceptation more than that, for all the culture of trees is assigned to the department of horticulture. In fact, even forestry itself is now generally considered as a science rightly included in horticulture. The garden is as important to-day as it was in the days of the Romans, but in our day it has become a greater world factor than at that time. All fruit-growing enterprises, though involving thousands of acres of land, belong now to horticulture. Fruit trees were in old times the product of the garden, but our orchards have outgrown the garden stage.

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THE WORKING CHILD WINS.

The New York legislative session, lately come to a close, was one of unusual interest in the matter of labor legislation. On one of the first days the Page Eight-Hour Bill was introduced, prohibiting all children under sixteen years of age working more than eight hours in factories of the State of New York. This soon became one of the most popular measures of the session. The especially valuable feature of the law which distinguishes it from any other child labor statute in this country is the requirement that these eight hours must fall between 8 a. m. and 5 p. m.

Lively opposition against this particular feature of the bill developed in the lower house. Opponents denounced the inelasticity of this arrangement as unreasonable and several attempts were made to amend it. But in the end the particular merit of this bill was recognized, inasmuch as it makes for real enforcement. In future factory inspectors will not have to discover how many hours a child has been at work in any factory, but its mere presence there before eight in the morning or after five in the afternoon will in itself be a violation.

A wave of public sentiment carried this humane measure triumphantly through the legislature. It was a foregone conclusion that Governor Hughes would sign the bill, as he had recommended this very step in his inauguration message.

The law marks a real gain for the working child. In New York City, especially, where the distance between factory and home is often very great and the transportation facilities poor, a working child often rose at 5:30 a. m. in order to reach work at 7 o'clock. And even if he left work at 6 o'clock, he was forced to travel home in the great crush hour, when facilities are at their worst and travel is most exhausting, even for adult men and women.

This beneficent legislation will, therefore, give the working child an additional hour for sleep in the morning, and an hour for recreation at night.—Secretary of the National Child Labor Committee in the Woman's Home Companion for August.

TO HASTEN TREE GROWTH.

When a man takes possession of a barren place and wishes to have it put on as presentable an appearance as possible at an early date, he should not only have it artistically planted with ornamental trees, but should have the ground thoroughly prepared for those trees. The better the ground is prepared the more rapid will be the growth of the trees. Many of our ornamental trees are put out in hard ground that has not been plowed or in any way prepared for them. The soil is so hard that the roots find it difficult to force their way through, and the plant food available is very limited. The compactness of the soil around the hole in which the tree is planted causes it to hold water for too long a time, and the roots that are curled up in the hole are thus prevented from performing their natural functions for many days at a stretch.

Ground in which ornamental trees are to grow should be as well enriched as for other kinds of trees and shrubs. The plant food is as necessary for them as for any other plant, and if the ground is well worked the drainage will be natural. If the tree is already planted and growing the soil may be slightly stirred on top and top dressings of manure applied. If the ground is to be worked deeply, it should be so worked beyond the farthest reach of the roots; but into this worked ground will come the roots of the trees in later years.

Ornamental trees may have their growth hastened in the same way as may any other plant. A good supply of plant food in a soil that is porous enough to let in the air and let out the water will have its effect. Is it not strange that people never seem to think of manuring shade trees? Their wants are the same as other plants, and they grow best in soil rich in plant food.

COW PEAS.

A writer for the Country Gentleman says: "The cow pea is a legume, and therefore not necessarily dependent on the soil for its nitrogen. It is the leguminous property or the power of appropriating nitrogen from the air that makes the cow pea an economical crop for improving the soil. The cow pea, it is true, will draw upon the soil nitrogen if there is plenty of it in the soil; but if there is not, it will develop tubercules on the roots and will take its nitrogen from the air.

"I have grown some cow peas each year for the past ten years, and when the cow peas were sown on soil where the nitrogen was deficient, the plants always developed tubercles on the roots. One year I sowed some cow peas on a plat of land very rich in nitrogen. I watched the peas carefully; they made a good growth, but there was not a tubercle to be found on the roots of the plants, showing that the cow peas were feeding on the soil nitrogen instead of that from the air. As I see it, the economy of growing legumes is to secure nitrogen without going to the expense of buying it. If the inquirer has stable manure, would it not be more economical to apply it to the meadows or to some other crop needing nitrogenous manure, and only use phosphate and potash for the cow peas, and thus secure the benefit of the nitrogen which the peas will draw from the air?

"One year I applied poultry manure to a small plat of cow peas; to another I applied wood ashes, and to another a good grade of dissolved bone. These three plats were on identically the same kind of soil, all deficient in nitrogen. I noted carefully the growth of the peas on these

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growth, and I could not see any difference in the growth of any of them. If I were going to sow cow peas as a catch crop after wheat, I would use only a dissolved bone phosphate on my land, as I believe that crops can get plenty of potash on my land, and I would depend entirely on the cow peas.

POTATOES FOR LEAD PENCILS.

Consul Frank S. Hannah, of Magdeburg, furnishes the following information concerning a new German composition to take the place of cedar in the manufacture of lead pencils:

About two and one-half years ago a small company was formed to perfect and exploit an invention which, instead of making use of the expensive cedar wood, substitutes a compact mass, the main ingredient of which is potatoes. The invention has finally been perfected and the pencils are being manufactured in large quantities preparatory to being placed on the market.

I have seen and used some of these pencils, which, while slightly heavier, are the same in size, form, and appearance as those at present in use, admit of sharpening a little more easily, and can be produced at a very nominal figure. A permanent company was founded in March at Berlin, acting under patents in fourteen countries, with a capital of $154,700, of which $95,200 represents the most of the patents, while $59,500 has been retained for a working capital. Of the working capital, $19,040 will be used in erecting a factory, with six presses and a daily output of 48,000 pencils. The cost of manufacture, all expenses included—rent, light, power, wages, composition, lead, selling cost, etc.—is estimated at $0.00928.

At the estimated production of 48,000 pencils a day, three hundred working days a year, the yearly production would be 14,400,000 pencils. According to recent statistics the export from Germany to foreign countries equaled 15,166 tons, with the total number of pencils at 3,033,200,000.

The cedar wood used at present in the manufacture of lead pencils is expensive and the quantity limited, while, on the other hand, the cultivation of potatoes is advancing each year. For these reasons this invention may mark the beginning of a new era in the production of lead pencils.

LAUNDERING JUMPER SUITS.

One of the problems of the everywhere popular jumper suits is the laundering. The Housekeeper for July gives some very helpful hints which will do much to solve the difficulty.

It is all important now that anything to be of service must be made with due regard to laundering, and that everyone should know how to give explicit directions to the laundress. Take for instance a jumper suit in tobacco brown linen or boys' Russian suit in the same color; after being washed with pure white soap and having salt in the last rinsing water, the starch should be mixed with boiling coffee (previously strained) instead of water, or it will leave white streaks and smudges all over the surface. Black goods may be treated in the same way.

For one suit take a tablespoonful of starch, one-half teaspoonful of borax (dissolved in a spoonful of boiling water), a quarter of an inch of tallow candle (if you have it) and mix into a smooth paste with two tablespoonfuls of cold water, add enough boiling coffee to make a stiff jelly. For ordinary hot water starch these are the correct proportions, using boiling water in place of coffee. While tan linen does not require special coddling, still some shades of buff and gray are liable to spot and streak. To obviate this use a tablespoonful of black pepper in the first water; this will also keep them from fading.

Most colors require either salt or vinegar in the last rinsing water to fix them; as a general rule the lighter colors take salt, the darker, vinegar. Both are used in the proportion of a tablespoonful to a quart of water. When in doubt use both. For lilac, mauve, or purples, vinegar will be found to slightly intensify as well as preserve the color. Blues are often ruined by their first trip to a careless laundress. Any shade of blue may be permanently fixed by soaking first in a bucket of water into which an ounce of sugar of lead has been poured.

If one wants a suit stiff it should be dried before starching—but in the shade, never in the sun, as colored clothes are sure to fade while wet, on the same principle that one bleaches white garments in strong sunshine. They should of course never be boiled. Pale green is a color that fades easily, but a little alum in the rinsing water will fix it.

Tussor and other washing silks are so easy to wash and iron, requiring no starch, that they are very practical for summer outings where there is difficulty in getting regular laundry work satisfactorily done. One can wash and iron three or four little girls' tussor dresses in half an hour, oneself, at a pinch, as they are ironed while wet. White wash silk waists are useful in the same way, making it easy to have a supply of fresh waists, independently of delayed laundry bundles.

The largest potato warehouse in the world, it is said, is being built at Stockton, Maine. This will be used for the reception of potatoes from the great Aroostook district. The warehouse is 900 feet long and 125 feet wide. The power for handling potatoes on conveyors will be electricity. The potatoes will be loaded into steamers either in bulk or in bags, as occasion may require.

Tonopah Silver Lead Mining Co.

The first issue of the Treasury will be placed on the Market on or about the 10th of September, 1907, a

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This property comprises 4 claims and a fraction, and is located about 12 miles from Tonopah, and only 4 miles from the Sampling Works and the Tonopah Railroad. Three shifts of men are working on the property, and are at present taking out good ore in silver and lead values, running from $40.00 to $130.00 per ton.

The present owners have proven the property, after purchasing the same, by putting up their own money, and this first allotment of Treasury stock is to provide a fund to do permanent work and put up machinery.

The Company is Capitalized at 1,000,000 shares of the par value of One Dollar per share and is incorporated under the laws of the State of Nevada, which makes the stock non-assessable.

The Directors and Officers of the Company are all well known business men of the City of Woodland, California.

For further particulars apply to Geo. N. Merritt of Woodland, California, the president of the Company; C. A. Richmond of the Bank of Yolo, the secretary of the Company; or to W. H. Routledge Company, Wm. Land Building, Sacramento, California, their fiscal agents.

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AUSTRALIAN MILKING MACHINE.

In a report several months ago the Canadian commercial agent at Melbourne referred to the market available in Australasia for a milking machine of satisfactory mechanism. He now writes to his government:

A few days ago I inspected the practical application of a recently invented Australian milking machine which is now undergoing exhaustive tests at the Victorian Agricultural College. Thousands of dairy farmers have followed with great interest the attempts made to evolve a milking machine that would displace hand milking with its drudgery, lack of cleanliness, and cost. It was apparently demonstrated that the secret of squeezing the cow's teat and drawing the milk at one and the same operation has been discovered, whereas other machines milk by suction only. This process has been patented in Canada, and full particulars are being forwarded by the inventors to a Canadian firm interested in dairying requisites, with a view of having the machines manufactured and sold in the Dominion.

WAY TO VENTILATE STABLES.

The subject of ventilation has been more or less talked about by the ranch owner who has a good barn and takes pride in giving his cows what is right for them. There is a right and a wrong way of ventilating the stable. One publisher says that to provide fresh air you should carry wood chutes three inches square from up under the eaves down to the stables, on the outside of the barn—having them enter and deliver the air within six inches of the floor. This, continues the publisher mentioned, does not create a draft about the cows but does furnish good air and does not chill the stable too rapidly. Dampers should be placed in every chute and partly closed during very windy, cold weather. One ventilator to each twelve cows will be sufficient. There should also be several air shafts two feet square, opening from the top of the stable. These should reach entirely up into the cupola, or discharge the heated and impure air outside under the eaves—never into the mow, for this air carries much moisture and will damage the fodder. The chute may also be used as a measure to throw down bay by having hinged doors at convenient distances. These should be kept closed and buttoned, to insure good ventilation and to prevent persons from falling down them. These shafts should have a door at their lower end that may be closed or partly closed during the severest weather.

This plan of ventilation does not seem to be a good one. It is too strongly calculated to make a cold stable, as the warm air is taken from the top of the stable and cold air admitted at the bottom. This will provide fresh air, but it will be cold air and we do not see that it is of any more advantage than it would be to bore holes in the walls of the stable to let the air circulate, without the cost of making expensive chutes. During the very cold weather we do not think that with the above method of ventilation it would make much difference to the cow whether she was inside or outside of the stable, unless the dampers were closed and then there would be no ventilation. A stable should be provided with a ventilating shaft, two feet square, for every twenty cows. This shaft should come to within six inches of the floor to take off the cold air. The inlets should start a foot above the floor on the outside of the barn, pass up inside the walls and open into the stable a foot below the ceiling. This will introduce the cold air when it will be warmed, and as the cold air in the stable is taken from the floor, but little heat is wasted and a stable so ventilated can be kept comfortable even when the thermometer is way below zero. If there is a strong wind blowing it may be necessary to close the inlets on the windward side, otherwise too much cold air will be forced into the stable.

BUREAU OF DAIRY INDUSTRY

The great dairy interest of this country, the largest single agricultural interest we have, is recognized only as an inferior division by the Department of Agriculture at Washington. It is placed under the control of the Bureau of Animal Industry with a paltry $50,000, with which to serve the 500,000 dairymen of the United States. No other branch of agriculture is organized as is dairying, yet no other has as little official recognition or influence at the seat of government. A number of interests, nowhere near as important, as, for instance, that of forestry or that of oils, are elevated to the dignity of bureaus, and are given a munificent sum of money to work along blind and indefinite lines. Most of all that the forestry people can do, is to speculate on what can be done. Already three state dairymen's conventions, that of Pennsylvania, Ohio, and Wisconsin, have passed resolutions, asking that the dairy division be advanced to the dignity and efficiency of a fully equipped bureau. There is just as hroad scope for scientific and constructive work in dairying as in any other of the classifications under which the department of agriculture operates. We suggest that all active and energetic dairy farmers and cheese factory and creamery operators take a moment's time to write their members of Congress on this matter. Don't put it off till a more convenient season and thus forget it, but write now.

A GREAT MOTOR.

Jamestown, Va., Aug. 30.—The passing of the horse, the mule, the ox, as indispensable factors in the operations of modern farming, is foreshadowed in the exhibit of the International Harvester Company at the exposition now in progress here. Here is shown a great variety of motors, stationary and portable, by which great labor-saving machines are operated, and for performing many functions of the horse, barn and field that have always been associated with toil and drudgery for both man and beast. By pressing a button or turning a valve, the up-to-date farmer can plow his land, barrow it, sow his seed, cultivate, harvest and thresh his crop, saw wood for his kitchen, pump water for domestic or irrigation purposes, cut ensilage, shell and grind corn, separate cream, churn butter, light his buildings by electricity and do scores of other things that, while saving labor and money, make life pleasanter for himself and his household. Power is now so easily and inexpensively applied that the demand for farm motors is as important as that for the machinery equipment. The question is not "will a gasoline motor meet my needs?" but "which will best serve my purpose?"

The gasoline engine has reached the practical stage; it is now a necessity. The economy of its direct power is undoubted. Motors shown in the exhibit have been subjected to all tests, and are found ever ready and effective at a minimum of expense. They require no engineer, no fireman, no far-fetched water supply. They do require a supply of gasoline—less than a pint per hour per horsepower. A 10-horsepower motor running at full strength consumes about a gallon an hour. No special operator is needed. When ready, the farmer turns a valve, gives the fly wheel a revolution or two by hand, and is then free to attend to other work; the motor will run itself till he closes the valve again.

There is shown in this exhibit a vertical motor, mounted on a substantial truck, adapted to use on rough roads, that may be drawn by hand or by horse to any part of the fields or wood lot. To it is belted a circular saw, whereby limbs and trunks of trees can be readily converted into firewood on the spot where the tree is felled. By a simple appliance the saw may be made to do the work of felling the tree. This motor can also be attached to a thresher in the field or made to cut and then haul ice from the river or pond for storage against the summer. It can be wheeled to the dairy and made to operate the churn or separator. Its uses are manifold and obvious. Its first cost is small, and its operation inexpensive. The average running expense may be figured close to one cent per hour per horsepower.

So with the stationary motor. By it can heavy threshing or pumping machinery be run as though by the strength of a child. A two horsepower motor will operate a dynamo that will supply current for 20 electric lights of 16 candlepower each—more than are ordinarily needed at one time in any farmer's house.

And there is no danger connected with these motors in themselves. The fuel is ordinary stove gasoline, which only becomes dangerous when used in an enclosed room where there is an open light flame. It is never necessary to use a flame about a Harvester Company's motor, as ignition is produced by an electric spark. The gasoline supply should be stored in a tank out of doors, in which case every element of danger is removed. In use the motor emits no smoke, scatters no sparks. The technical knowledge required to operate the motor can be very quickly acquired by any man or intelligent boy. In case of breakage, any part can be promptly supplied by the nearest dealer. In construction the motor is simplicity itself.

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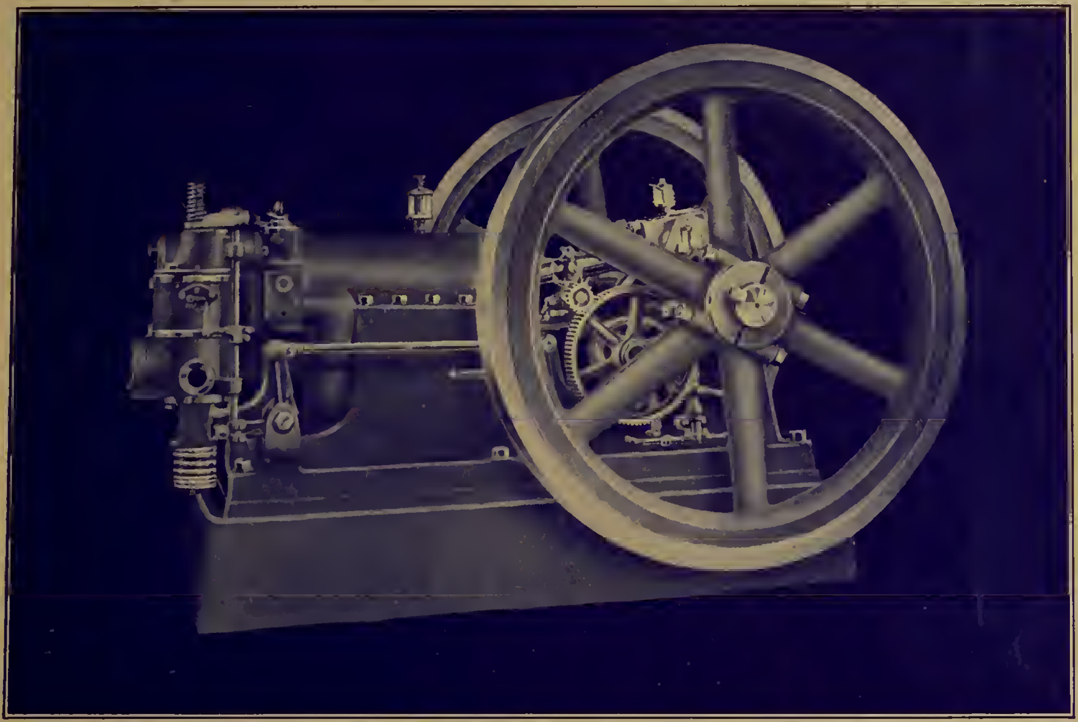

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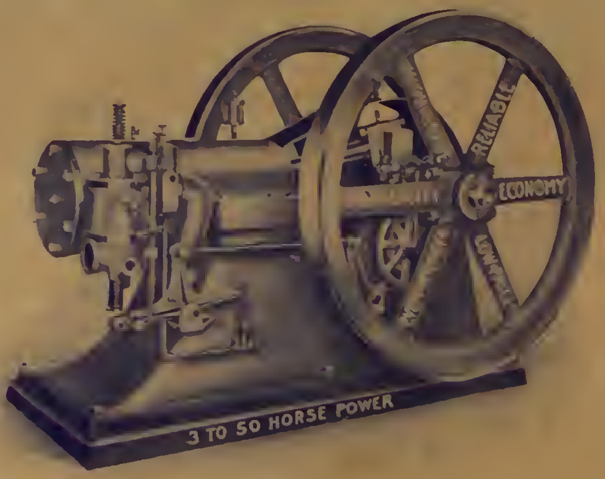

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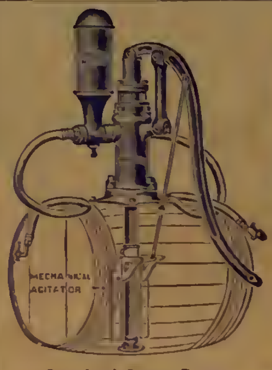

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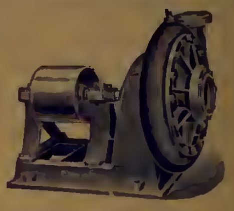

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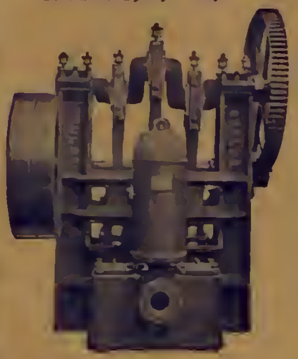

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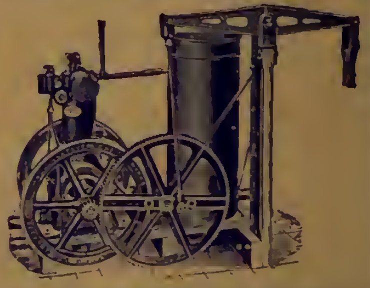

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